


West Virginia University

Graduate Catalog



1996-98 Bulletin



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West Virginia University

1996-98 Graduate Catalog



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—Office of the President

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Table of Contents

Part 1 Government and Organization of WVU	5
Board of Trustees, Board of Advisors, Cabinet	7
Assistant Vice Presidents, Deans, Directors.....	8
Chaired and Distinguished Professors	9
Degree Programs	10
Part 2 Graduate Education at WVU	13
Organization	14
Graduate Faculty	14
Application	16
International Students	18
Transfer Procedures	20
Admission	21
Enrollment and Registration	23
Scholarship	26
Withdrawals	28
Degree Completion	30
Doctoral Degree	31
Summary of Doctoral Requirements	34
Summary of Master's Requirements	35
Part 3 Facilities, Fees, and Financial Aid	36
Facilities, Housing, Library Services	36
Residency Policy	38
Fees and Expenses	40
Student Refund Policy	41
Financial Aid	43
Academic Honesty/Integrity	45
Fee Charts	48
Part 4 Programs and Courses	50
College of Agriculture and Forestry	53
Agricultural Education (M.S.)	59
Agricultural and Resource Economics (M.S.)	60
Agricultural Sciences (Ph.D.)	64
Agriculture (M.Agr.)	66
Animal & Veterinary Sciences (M.S.)	67
Family Resources (M.S.)	70
Forestry (M.S.R.P.M., M.S.W.F.M., M.S.F., Ph.D.)	73
Genetics and Developmental Biology (M.S., Ph.D.)	80
Natural Resource Economics (Ph.D.)	82
Plant and Soil Sciences (M.S.)	87
Reproductive Physiology (M.S., Ph.D.)	89
Eberly College of Arts and Sciences	91
Biology (M.S., Ph.D.)	102
Chemistry (M.S., Ph.D.)	107
Communication Studies (M.A.)	111
Computer Science (M.S., Ph.D.)	115
English (M.A., Ph.D.)	122
Foreign Languages (M.A.)	127
Geography (M.A.)	137
Geology (M.S., Ph.D.)	143
History (M.A., Ph.D.)	149
Liberal Studies (M.A.L.S.)	158
Mathematics (M.S., Ph.D.)	160
Philosophy (no graduate degree)	165

Physics (M.S., Ph.D.)	166
Political Science (M.A., Ph.D.)	170
Psychology (M.A., Ph.D.)	178
Public Administration (M.P.A.)	185
Sociology and Anthropology (M.A.)	189
Statistics (M.S.)	192
Women's Studies (no graduate degree)	196
College of Business and Economics	198
Professional Accountancy (M.P.A.)	202
Business Administration (M.B.A.)	206
Economics (M.A., Ph.D.)	216
Industrial Relations (M.S.)	224
College of Creative Arts	231
Art (M.A., M.F.A.)	233
Music (M.M., D.M.A., Ph.D.)	240
Theatre (M.F.A.)	253
School of Dentistry	260
Dental Hygiene (M.S.)	261
Endodontics (M.S.)	263
Orthodontics (M.S.)	265
College of Engineering and Mineral Resources	267
Chemical Engineering (M.S.C.E., M.S.E., Ph.D.)	276
Civil and Environmental Engineering (M.S.C.E., M.S.E., Ph.D.)	282
Electrical and Computer Engineering (M.S.E.E., M.S.E., Ph.D.)	291
Industrial and Management Systems Engineering	301
(M.S.I.E., M.S.O.H.O.S., M.S.E., Ph.D.)	
Mechanical and Aerospace Engineering	310
(M.S.M.E., M.S.A.E., M.S.E., Ph.D.)	
Mining Engineering (M.S., Ph.D.)	323
Petroleum and Natural Gas Engineering (M.S.P.N.G.E.)	328
Safety and Environmental Management (M.S.)	331
College of Human Resources and Education	334
Counseling (M.A.)	342
Education Foundations (no graduate degree)	349
Education Leadership Studies (M.A.)	350
Educational Psychology (M.A.)	355
Elementary Education (M.A.)	359
Reading (M.A.)	366
Rehabilitation Counseling (M.S.)	369
Secondary Education (M.A.)	372
Special Education (M.A.)	377
Speech Pathology and Audiology (M.S.)	386
Technology Education (M.A.)	391
Perley Isaac Reed School of Journalism	398
Journalism (M.S.J.)	399
School of Medicine	407
Anatomy (M.S., Ph.D.)	412
Biochemistry (M.S., Ph.D.)	416
Center on Aging	418
Community Health Promotion (M.S.)	419
Exercise Physiology (M.S., Ed.D.)	422
Medical Technology (M.S.)	425
Microbiology and Immunology (M.S., Ph.D.)	428
Pharmacology and Toxicology (M.S., Ph.D.)	432
Physiology (M.S., Ph.D.)	435
Public Health (M.P.H.)	438

School of Nursing	441
Nursing (M.S.N.)	444
School of Pharmacy	451
Pharmaceutical Sciences (M.S., Ph.D.)	452
School of Physical Education	456
Physical Education (M.S., Ed.D.)	457
School of Social Work	464
Social Work (M.S.W.)	465
Part 5 Special Opportunities	474
Part 6 Index	480
Campus Maps	486
Academic Calendar 1996-97	488

Correspondence

Academic Programs

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and Research
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Admissions, Catalogs, Records

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West Virginia University
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Graduate Programs

Office of Graduate Education
West Virginia University
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Housing and Residence Life

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West Virginia University
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Scholarships and Work-Study

Student Financial Aid Office
West Virginia University
P.O. Box 6004
Morgantown, WV 26506-6004
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Student Life

Dean, Student Life
West Virginia University
P.O. Box 6411
Morgantown, WV 26506-6411
Phone: (304)293-5611 FAX: (304)293-7028

Veterans Educational Assistance

Financial Aid Office
West Virginia University
P.O. Box 6004
Morgantown, WV 26506-6004
Phone: (304)293-5242/8250 FAX (304)293-4890

Part 1 Governance and Organization of WVU

University of West Virginia System Board of Trustees

The University of West Virginia Board of Trustees oversees the University of West Virginia System, composed of West Virginia University, including Potomac State College and WVU-Parkersburg, Marshall University, the West Virginia Graduate College, and the West Virginia School of Osteopathic Medicine.

The twelve members that serve on the board are appointed by the governor, with the advice and consent of the Senate, and five ex-officio members, including the chancellor of the Board of Directors System and the State Superintendent of Schools, who are nonvoting members, and the chairs of the Advisory Councils of faculty, classified staff and students who are voting members. The board directs policy and budget and approves and monitors degree programs. The board appoints the president of the University and assigns to the president final authority for personnel actions at West Virginia University except for those matters that relate to the President's own employment and compensation.¹

WVU Board of Advisors

The Board of Advisors reviews and provides advice upon all University proposals involving the University's "mission, academic programs, budget, capital facilities, and such other matters as requested by the president of the institution or the Board of Trustees or otherwise assigned by law." The board also may review "all proposals regarding institution-wide personnel policies."

The board ordinarily has 11 members, including seven lay citizens of West Virginia, a University administrative officer appointed by the president, a full-time faculty member with at least the rank of instructor elected by the University faculty, a student in good academic standing chosen by the student body, and a member of the classified staff elected by the classified staff. When serving as the search and screening committee for a new University president, the Board of Advisors is expanded to seventeen members.¹

Faculty Senate

The Faculty Senate is an elected, representative body chosen by the members of the Faculty Assembly. The Senate exercises the legislative power of the faculty and has the authority to recommend general policies to the President and the Board of Trustees with regard to objectives and academic standards for the University. The Senate (1) considers issues related to the organizational structure of the University with reference to academic matters; (2) approves programs and courses, the academic calendar, and class scheduling; (3) examines elements of student life; (4) recommends general policies for convocations, lectures, entertainment, publications, radio/television, and libraries, physical plant, and equipment; (5) recommends honorary degree candidates; and (6) regulates educational policies, programs, and functions under its purview. Decisions are subject to review by the Faculty Assembly and approval by the President and Board of Trustees.

Senators are elected by members of the University faculty. For continuity, approximately one third of the Senate is elected each year. Senators normally serve for a term of three years. They are eligible to serve two consecutive full terms but then are ineligible for reelection until one year has elapsed.²

¹ Taken from the 1993 West Virginia University Faculty Handbook.

² Taken from the 1993 West Virginia University Faculty Senate Handbook.

Faculty Assembly

The University Faculty Assembly includes the University president as presiding officer, vice presidents, academic deans, associate deans, professors, associate professors, assistant professors, and instructors holding appointments on a full-time basis. The assembly meets once a year in September. West Virginia University also has a tradition of strong student administration that touches all aspects of student life and represents student opinion to the administration and faculty. Student administration has three main units: the executive branch, the 11-member board of governors, and the judicial board. Students also serve on University-wide committees and on the Mountainlair Advisory Council.

Staff Council

The Staff Council is an advisory council to the president of the University and a means for all classified employees to express their opinions about job conditions, fringe benefits, employee-employer relations, or other areas that affect their jobs. The council is composed of 18 elected members.

The Advisory Council of Classified Employees (ACCE) assists the University of West Virginia Board of Trustees.

The Local 814, Laborers' International Union of North America, AFL-CIO, represents employees in craft, service and maintenance positions in the Mountainlair, athletics, physical plant, housing and residence life, publications, Health Sciences Center, WVUH, Inc., parking, transportation, and the mail service.

West Virginia University is a member of the North Central Association of Colleges and Schools. The University's educational programs are accredited by the North Central Association and by the appropriate accreditation agencies for professional programs.

The 1996-98 West Virginia University Graduate Catalog, published by Publications Services, is a general source of information about course offerings, academic programs and requirements, expenses, rules, and policies. The courses, requirements, and regulations contained herein are subject to continuing review and change by the University of West Virginia Board of Trustees, University administrators, and the faculties of the colleges and schools to meet the goals and objectives of the University. The University, therefore, reserves the right to change, delete, supplement, or otherwise amend at any time the information, course offerings, requirements, rules, and policies contained herein without prior notice.

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Nancy Wood, Executive Assistant to the
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Stephen Showers, Assistant VP for Facilities and Services
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Deans

Aerospace Studies, Col. John Gurtcheff
College of Agriculture and Forestry, Rosemary Haggett
Eberly College of Arts and Sciences, Rudolph Almasy (Interim)
College of Business and Economics, Sydney V. Stern
College of Creative Arts, Philip Faini
School of Dentistry, Robert Moore
College of Engineering and Mineral Resources, Allen Cogley
College of Human Resources and Education, Jane Applegate
Perley Isaac Reed School of Journalism, William T. Slater
College of Law, Teree E. Foster
Library Services, Ruth M. Jackson
School of Medicine, Robert D'Alessandri
School of Nursing, E. Jane Martin
School of Pharmacy, George R. Spratto
School of Physical Education, Dana Brooks
School of Social Work, Karen V. Harper
Student Affairs, Herman L. Moses

Directors

AAO/EEO Program, Jennifer McIntosh
Academic Computing, Donald McLaughlin (Interim)
ADA Compliance, Barbara T. Judy (Interim)
Administrative Services, Jeri Ireland
Admissions and Records, Glenn G. Carter
Athletics, Edward M. Pastilong
Budget Planning, Narvel G. Weese, Jr.
Bureau of Business Research, Tom S. Witt
Career Services Center, Robert L. Kent
Carruth Center for Counseling & Psychological Services/Disability Services, Philip E. Comer
Center for Aging/Education Unit, Rick A. Briggs (Interim)
Center for Black Culture and Research, Charles Blue (Interim)
Center for Women's Studies, Helen M. Bannan
Computing Services, William J. Logar
Concurrent Engineering Research Center (CERC), Ramana Reddy
Controller, Scott A. Ludlow
Environmental Health & Safety, Roger L. Pugh
Extended Learning, Sue Day-Perroots
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Institute of Occupational Environmental Health, Alan M. Ducatman
Institute for Public Affairs, Robert Dilger
Institutional Analysis & Planning, Kathleen K. Bissonnette
Internal Auditing, William R. Quigley
International Programs, Edna L. McBreen
Mary Babb Randolph Cancer Center, Fred Butcher
Military Science, LTC Margaret M. Bahnsen
Mountainlair, Michael Ellington (Interim)
Nat'l Research Ctr. for Coal & Energy, Richard A. Bajura
News & Information Services, Rebecca Lofstead
Physical Plant, Dorsey D. Jacobs
Printing Services, Paul H. Stevenson

Publications Services, Angela Caudill
(Interim)
Public Safety and Parking Management,
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Purchasing & Inventory Management,
Douglas D. Knorr
Radio and Television Services,
Susan E. Davis
Regional Research Institute,
Andrew M. Isserman
Research Facilities Office, James R. Shaub
Small Business Institute, Cindy Martinec
Sponsored Programs, William W. Reeves
Student Activities and Educational
Programming, David H. Taylor
Telecommunications and Network
Services, Floyd R. Crosby, Jr.
Transportation and Mail Service,
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Undergraduate Academic Services Center,
Nicholas Evans
UACDD, Ashok Dey
University Honors Program and Governor's
School for Science and Math,
William E. Collins
WV Network, Henry Blosser

Chaired and Distinguished Professors

Daniel Banks, M.D., N. LeRoy Lapp
Professor of Pulmonary and Critical Care
Medicine
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Professor of Law
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Sciences Centennial Professor of English
Echol "Bud" E. Cook, George Berry Chair
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Professor of Physics
Naresh Dalal, Eberly College of Arts and
Sciences Centennial Professor of
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Charles R. DiSalvo, Woodrow A. Potesta
Professor of Law
Georg Eifert, Eberly Professor of Clinical
Psychology
William W. Fleming, Mylan Chair of
Pharmacology

Gabor B. Fodor, Centennial Professor of
Chemistry, *Emeritus*
Ruel E. Foster, C.W. Benedum Professor
of English, *Emeritus*
Mathis Frick, Orlando Gabriele Chair of
Radiology
Frank Gagliano, C.W. Benedum
Professor of Theatre
Mark Gibson, M.D., OB/GYN, Margaret
Sanger Chair of Family Planning and
Reproductive Physiology
Rakesh K. Gupta, GE Plastics Professor
of Materials Engineering
Robert Hoeldtke, Charles E. Compton
Chair of Nutrition
Ronald L. Klein, Power Professor of
Electrical and Computer Engineering
Davied Kreulen, Edward J. Van Liere
Professor of Physiology
Kennon Lattal, Eberly College of Arts and
Sciences Centennial Professor of
Psychology
Ronald Lewis, Eberly Professor of
American History
Donald E. Lively, William J. Maier, Jr.,
Visiting Chair of Law
Robert Moss Markley, Jackson Chair of
English
Robert S. Maust, Louis F. Tanner
Professor of Public Accounting
Brian McHale, Eberly Professor of
American Literature
Thomas P. Meloy, C.W. Benedum
Professor of Mineral Processing
William H. Miernyk, C.W. Benedum
Professor of Economics, *Emeritus*.
Syd S. Peng, Charles T. Holland Professor
of Mining Engineering
Hayne W. Reese, Centennial Professor of
Psychology
Mohindar Seehra, Eberly Professor of
Physics (Materials Science)
Kenneth Showalter, Eberly Professor of
Chemistry

WVU Degree Programs

College of Agriculture and Forestry

Agricultural and Resource Economics	M.S.
Agricultural Education	B.S.Agr. M.S.
Agricultural Sciences	Ph.D.
Agriculture	M.Agr.
Animal and Veterinary Sciences	B.S., B.S.Agr. ... M.S.
Family Resources	B.S.Fam.Res. ... M.S.
Forest Resources Management	B.S.F.
Forest Resource Science	Ph.D.
Forestry	M.S.F.
Landscape Architecture	B.S.L.A.
Natural Resource Economics	Ph.D.
Plant and Soil Sciences	B.S.Agr. M.S.
Recreation and Parks Management	B.S.R. M.S.
Resource Management	B.S., B.S.Agr.
Wildlife and Fisheries Resources	B.S. M.S.
Wood Industries	B.S.F.

Eberly College of Arts and Sciences

Biology	B.A. M.S. Ph.D.
Chemistry	B.A., B.S. M.S. Ph.D.
Communication Studies	B.A. M.A.
Computer Science	B.S. M.S. Ph.D.
Economics	B.A.
English	B.A. M.A. Ph.D.
Foreign Languages	B.A. M.A.
Geography	B.A. M.A.
Geology	B.A., B.S. M.S. Ph.D.
History	B.A. M.A. Ph.D.
Interdepartmental Studies	B.A.
Liberal Studies	M.A.L.S.
Mathematics	B.A. M.S. Ph.D.
Philosophy	B.A.
Physics	B.A., B.S. M.S. Ph.D.
Political Science	B.A. M.A. Ph.D.
Psychology	B.A. M.A. Ph.D.
Public Administration	M.P.A.
Sociology and Anthropology	B.A. M.A.
Statistics	B.S. M.S.

Board of Regents Bachelor of Arts Degree

Board of Regents	B.A.
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College of Business and Economics

Accounting	B.S.B.Ad.
Business Management	B.S.B.Ad.
Economics	B.S. M.A. Ph.D.
Finance	B.S.B.Ad.
Industrial Relations	M.S.
Marketing	B.S.B.Ad.
Professional Accountancy	M.P.A.

College of Creative Arts

Art	M.A.
Music	B.M. M.M. D.M.A., Ph.D.
Theatre	B.F.A. M.F.A.
Visual Art	B.F.A. M.F.A.

School of Dentistry

Dental Hygiene	B.S. M.S.
Dentistry Specialties	D.D.S.
Dental	M.S.

College of Engineering and Mineral Resources

Engineering	M.S.E. Ph.D.
Aerospace Engineering	B.S.A.E. M.S.A.E.
Chemical Engineering	B.S.Ch.E. M.S.Ch.E.
Civil Engineering	B.S.C.E. M.S.C.E.
Computer Engineering	B.S.Cp.E.
Electrical Engineering	B.S.E.E. M.S.E.E.
Engineering of Mines	B.S.E.M. M.S.E.M.
Industrial Engineering	B.S.I.E. M.S.I.E.
Mechanical Engineering	B.S.M.E. M.S.M.E.
Mineral Engineering	Ph.D.
Occupational Hygiene and Occupational Safety	M.S.
Petroleum and Natural Gas Engineering ..	B.S.PNGE. M.S. PNGE.
Safety and Environmental Management ...	M.S.

College of Human Resources and Education

Education	Ed.D.
Counseling	M.A.
Education Administration	M.A.
Educational Psychology	M.A.
Elementary Education	B.S.E.Ed. M.A.
Reading	M.A.
Rehabilitation Counseling	M.S.
Secondary Education	B.S.S.Ed. M.A.
Special Education	M.A.
Speech Pathology and Audiology	B.S. M.S.
Technology Education	M.A.

Interdisciplinary Studies

Genetics and Developmental Biology	M.S. Ph.D.
Liberal Studies	M.A.L.S.
Reproductive Physiology	M.S. Ph.D.

Perley Isaac Reed School of Journalism

Journalism	B.S.J. M.S.J.
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College of Law

Law	J.D.
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School of Medicine

Anatomy	M.S.	Ph.D.
Biochemistry (Medical)	M.S.	Ph.D.
Community Health Promotion	M.S.	
Exercise Physiology	B.S.	M.S.
Medical Technology	B.S.	M.S.
Medicine		M.D.
Microbiology and Immunology	M.S.	Ph.D.
Occupational Therapy	M.S.	
Pharmacology and Toxicology	M.S.	Ph.D.
Physical Therapy	B.S.	
Physiology (Medical)	M.S.	Ph.D.
Public Health	M.P.H.	

School of Nursing

Nursing	B.S.N.	M.S.N.
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School of Pharmacy

Pharmaceutical Sciences	M.S.	Ph.D.
Pharmacy	B.S.Pharm.	Pharm. D.

School of Physical Education

Physical Education	B.S.P.Ed.	M.S.	Ed.D.
Sport Studies	B.S.P.Ed.		

School of Social Work

Social Work	B.S.W.	M.S.W.
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Part 2 Graduate Education at West Virginia University

The origin of graduate education can be traced to the medieval universities of Europe; the goal for graduate study has remained unchanged over the intervening centuries. A student undertakes such study in order to gain a deeper knowledge in a particular academic discipline and to become able to demonstrate to the faculty and practitioners in the field the attained mastery of knowledge. Consequently, graduate study cannot be defined primarily in terms of semester hours of course work beyond the baccalaureate, even though minimum course work requirements are commonly specified for graduate degrees. Minimum requirements set the lower limit for an integrated plan of study.

Graduate students are expected to become participating members of the University community and are encouraged to attend the lectures presented by visiting scholars, to listen to academic discussions of their faculty, to serve on departmental committees, and to study with their fellow graduate students. The purpose of residency requirements is to promote such participation in the academic affairs of the university.

Seminars

Graduate students enrolled in a graduate program within West Virginia University are expected to participate in a seminar course throughout their graduate career. Depending on the objectives set by a particular graduate program, seminars may:

- Provide an opportunity for the student to be exposed to a variety of topics.
- Give the student insight into the methods by which to communicate the significance of their research.
- Allow the student to hear outside speakers, or
- Engender discussion with faculty concerning research and the development of research methodology.

Minimum Admission Standards

At WVU, the minimum standards for admission to graduate study are set by the University Graduate Council. Beyond this point, however, faculty members in a given graduate program have complete control over who is to be admitted to undertake graduate study under their supervision; and ultimately it is they who certify which students have demonstrated sufficient mastery of the discipline to qualify for a graduate degree. While a student may be admitted for the purpose of enrolling in advanced course work, only the program faculty may grant permission for the pursuit of a degree. Likewise, a student will not be recommended for a degree until the graduate faculty of a program has indicated in writing that the student has gained the desired knowledge.

Policies

The graduate catalog sets forth the policies and rules for graduate education. It is essential that all students beginning study at the graduate level become familiar with regulations for graduate study in general as well as with the requirements of their own programs—both of which are detailed in this catalog. **Each student should request a graduate catalog when beginning graduate study and become conversant with its contents.**

Academic Common Market

West Virginia provides its residents the opportunity, through the Academic Common Market (ACM) and through contract programs, to pursue numerous academic programs not available within the state. Both programs permit West Virginians to enter out-of-state institutions at reduced tuition rates. Contract programs have been established for study in optometry, podiatry, and veterinary medicine. ACM programs are restricted to West Virginia residents who have been accepted for admission to one of the specific programs

at designated out-of-state institutions. Through reciprocal agreement, WVU allows residents of states within the ACM to enroll in graduate and undergraduate programs on a resident tuition basis.

Further information may be obtained through the Associate Provost for Curriculum and Instruction, Stewart Hall, West Virginia University, P.O. Box 6203, Morgantown, WV 26506-6203; or by calling (304) 293-2661. Application must be made through the higher education authority of the state of residence. For West Virginia residents, this authority is the University of West Virginia Board of Trustees, 950 Kanawha Boulevard East, Charleston, WV 25301.

Organization of Graduate Education

West Virginia University, which is both the comprehensive and land-grant university in the West Virginia system of higher education, offers graduate work leading to 78 master's degrees and 32 doctoral degrees. The graduate programs are administered by 14 schools and colleges of the University and by some inter-unit committees.

Office of Graduate Education

The director of the Office of Graduate Education oversees the policies governing graduate education, monitors the quality of graduate programs, and sets goals for enhancing graduate education at West Virginia University. The director of graduate education reports to the associate provost for curriculum and instruction. The associate provost for curriculum and instruction derives his authority from the provost and vice president for academic affairs and works closely with the vice president for Health Sciences.

Graduate Council

The University Graduate Council consists of twelve elected faculty representatives from the schools and colleges offering graduate programs and five ex-officio nonvoting members representing the provost, the director of graduate education, the vice president for health sciences, the senate executive committee, and the graduate and professional student association. **The council derives its authority from the faculty and from the provost and vice president for academic affairs and research.** This body formulates, reviews, and recommends University-wide graduate education policies. The council reviews proposals for new graduate programs, evaluates major revisions in graduate curricula, coordinates periodic program reviews, establishes the University criteria for graduate faculty membership, and considers such other matters affecting graduate education as are brought to the council by an administrative officer of the University, a graduate faculty member, or a graduate student. The duties of the University Graduate Council include responsibility for graduate programs both on- and off-campus.

Schools and Colleges

Schools and colleges manage most of the day-to-day operation of graduate education. They determine the level of participation by individual faculty members, they specify requirements for programs under their jurisdiction, and they certify students for graduation.

Graduate Faculty

Members of the graduate faculty continue to play the most important role in graduate education. They are responsible for program content, they serve on graduate student committees, and they assure the quality of preparation of the University's graduates.

Regular Membership

- Regular members may chair students' committees or direct master's and doctoral research, theses, and dissertations.

- Regular members must hold appointments in tenure track positions.
- Regular members must hold either a terminal degree or have demonstrated equivalent scholarly or creative achievement as defined by their school or college. The definition of equivalent credentials must include, as a minimum, the attainment of the rank of associate professor.
- Regular members must present evidence of continuing scholarly, research, or creative activity.

Schools and colleges set and publish quantitative and qualitative criteria regarding scholarly activity. These criteria are to be applied for the appointment as well as continuation of graduate faculty membership. **These initial criteria and any subsequent amendments or changes are subject to approval of the University Graduate Council** and usually include many of the following: publication in major peer review journals, publication of books and book chapters, invited and/or competitively-selected presentations of scholarly work at national and international meetings, and/or presentations and performance of artistic work at professionally-recognized affairs.

Associate Membership

Associate members may perform the same function as regular members with the exception of chairing students' committees or directing master's theses and doctoral dissertations (or equivalent). It is the prerogative of the schools and colleges to establish and publish their own criteria for associate membership. These initial criteria and any subsequent amendments or changes are subject to approval of the University Graduate Council and should include one or more of the following requirements: research activity, scholarly publications, artistic performances or presentations, teaching experience, and service on previous committees.

Exceptions

The following individuals must meet the same criteria (regular or associate) for review, approval, and continuation as graduate faculty:

- Visiting professors may be appointed as members of the graduate faculty for the term of their appointments but cannot chair committees.
- Faculty holding non-tenure track appointments may be considered for graduate faculty membership.
- Emeritus faculty members may remain on the graduate faculty, subject to review.
- Off-campus professionals willing to participate in graduate education may be acceptable as graduate faculty but may not chair student committees (exceptions may be approved by the director of graduate education).
- Individuals holding faculty appointments in institutions participating in cooperative doctoral programs may be considered graduate faculty, subject to school or college review.

Degree Candidates

Normally, no candidate for a degree at WVU may be a regular or associate member of the graduate faculty. Individuals seeking exceptions to this policy must submit a petition to the director of graduate education.

Evaluation of Graduate Faculty

Individuals interested in appointment to the graduate faculty must request their evaluation for initial membership. Associate members interested in reclassification as regular members must request evaluation. Faculty seeking graduate faculty status must first be evaluated by the school or college in which they hold their primary faculty appointment. If a faculty member holds a secondary appointment in another school or college or wishes

to have graduate faculty status in a second school or college, this is permissible; however, faculty may not be designated a regular graduate faculty member in any school or college if such a status is not held in the primary school or college.

Time Schedule

Schools and colleges should establish an appropriate time schedule for evaluating faculty for initial appointment to the graduate faculty and for upgrading graduate faculty status. All graduate faculty are reviewed annually. The annual review is intended to assist graduate faculty members in gauging their continued progress in scholarship, research, or creative activity. **The review process for graduate faculty membership should coincide with the annual review process of all faculty.** Schools and colleges determine the appropriate mechanisms by which faculty are reviewed (School or College Graduate Council, Promotion and Tenure Committee, etc.). The results are placed in the individual's personnel file.

Continuance

Once every three years, the graduate faculty review of individuals must be accompanied by a decision to continue or discontinue their current level of membership. A faculty member whose graduate faculty membership is discontinued or changed from regular to associate status will be permitted to complete current responsibilities but may only assume additional responsibilities which are consistent with the new status.

Appeals

Appeals regarding graduate faculty membership classification shall be handled through grievance procedures identified in *Policy Bulletin 36*. Exception to any of the above must be approved by the University Graduate Council.

Faculty Pursuing Advanced Degrees

No faculty member holding instructor or professorial rank in a program unit (department, division, interdisciplinary committee, etc.) may be admitted to a graduate degree program offered through that unit. Only those people with a rank of teaching fellow, lecturer, etc. can simultaneously pursue a degree in their own unit. Faculty holding instructor or professorial rank may be admitted to a graduate degree program in another program unit.

Application

Graduate study at WVU can be compared to a contractual arrangement between the student and the graduate faculty of the University. **The student's rights, privileges, obligations, and responsibilities are contained in the graduate catalog, the plan of study, and, if research is one of the degree program requirements, the prospectus.** Although not contracts in the formal legal sense, they are agreements between the University and a student for the accomplishment of planned educational goals.

The WVU Graduate Catalog, in effect when a student begins work toward an advanced degree, constitutes the agreement between the student and West Virginia University. If there are major changes in the catalog during the course of a student's studies, a student, with the approval of his/her advisor, may agree to meet the conditions of the graduate catalog of a later year. **An agreement to change to a later catalog is an agreement to meet all the conditions of the later edition.** Students must abide by catalog changes if the changes were promulgated by the Board of Trustees or local, state, or federal law.

GRE/GMAT

Many programs at WVU require graduate record examination (GRE or GMAT) scores from all applicants, but in no program is an examination score the sole criterion for admission. Some programs require both the general and the appropriate advanced tests before considering an applicant for admission. Other programs require different tests, such as the Miller Analogies. **Specific admission requirements are found in the program sections of this catalog.** Students should take the tests required for their prospective graduate majors before enrollment in graduate studies. If GRE or GMAT tests are required, the applicant should request the Educational Testing Service to forward scores to the WVU Office of Admissions and Records.

Applications to take the GRE or GMAT must be mailed to the Educational Testing Service, Princeton, NJ 08540. Information about the Miller Analogies Test may be obtained from the psychology department or the counseling service of the applicant's undergraduate institution. At WVU, call the Student Counseling Service at 293-4431.

Initial Inquiry

Prospective graduate students are urged to apply for admission as early as possible. The first inquiry from a person interested in a degree program should request information from the department, division, school, or college offering the program. The reply to such an inquiry will include instructions for applying to the particular program.

Forms/Fees

In all cases, application for admission to graduate study must be made on standard forms provided by the Office of Admissions and Records. The completed form may be returned to the Office of Admissions and Records and must be accompanied by payment of a nonrefundable special service fee.

Transcripts

Applicants must at the same time arrange for an official transcript to be sent directly to the Office of Admissions and Records by the registrar or records office of the previous colleges and universities attended by the applicant. Transcripts should be requested from all institutions attended in the course of undergraduate or graduate study. Transcripts received by the Office of Admissions and Records become the property of WVU. No one is admitted to graduate study who does not hold a baccalaureate degree.

Admission

If an applicant meets the minimum admission requirements of WVU, a copy of the application is forwarded to the faculty of the program of interest. Any graduate degree program is permitted to set admission requirements beyond the minimum admission standards of the University. **No one can pursue an advanced degree at WVU unless admitted to the appropriate degree program.** A student who wishes to take courses after completing a degree must submit a new application and pay the nonrefundable service fee.

Non-degree Applicants

Students not wishing to pursue an advanced degree may apply for admission as non-degree graduate students. Applicants must complete the standard application form, pay the nonrefundable special service fee, state the area of intended study, and present evidence of a baccalaureate degree.

Second Review

Any applicant who is refused admission may have his or her application reviewed again within a year instead of submitting a new application form and fee. Any applicant who fails to enroll within a year after acceptance must reapply in the regular manner for consideration for a subsequent year.

Reapplication

When students graduate or complete the program for which they applied, they must reapply and be readmitted before taking further course work at WVU. This policy assures that the University is informed of students' objectives and assigns them an appropriate advisor. Students are assessed the service fee for each new application.

Continuance

Master's degree students are permitted to continue in a program for a maximum of eight years under their original application. Students who have not been active students for two years must reapply and be readmitted. The application fee is assessed.

Concurrent or Additional Master's Degree

University policy permits students to obtain more than one master's degree. In these cases, a separate application is required for each program. Each application must be accompanied by payment of a nonrefundable special service fee.

A student desiring to obtain more than one master's degree must successfully complete sufficient additional credit hours to constitute 75 percent of the credit hours required by the additional master's degree program. An individual graduate unit may require a higher percentage of credit to be earned under its direction.

Reactivation Application

Degree students who have been inactive for two or more years are not eligible to reactivate but must reapply for admission.

International Students

West Virginia University is authorized under federal law to enroll nonimmigrant foreign nationals as students. International students wishing to enroll for graduate work at WVU must comply with the stated academic requirements for admission and with certain additional academic and nonacademic requirements.

Letter of Inquiry

International applicants should forward a letter of inquiry one year before they intend to begin study in the United States. The University receives a large number of applications from international students. For this reason and because of the time required for the student to make visa and financial arrangements, April 1 has been established as a deadline after which applications cannot be processed for fall admission. International students applying for admission to West Virginia University must submit the following:

- A completed international student admission application.
- The mandatory application fee.
- The official results of the Test of English as a Foreign Language (TOEFL). TOEFL results must be sent directly to WVU by the Educational Testing Service (ETS).
- Original or certified copies of the applicant's official academic record in the original language of issue. Applicants who have studied in the United States are required to have the institutions send an official transcript directly to WVU;

- Original or certified copy of official certification of degree in the original language of issue.
- Official English translations of the applicant's academic record and certification of degree.

All of the items listed above should be sent to the Office of Admissions and Records, West Virginia University, P.O. Box 6009, Morgantown, West Virginia 26506-6009. All material must be received by the application deadline. **All application materials should be submitted at one time if possible;** TOEFL scores and official transcripts from institutions within the United States should be requested so that these materials arrive at WVU at about the same date as the other application materials. Incomplete applications can not be guaranteed consideration for the desired semester. Applicants are encouraged to contact the academic program of interest for information about requirements other than those listed above.

Financial Documents/Student Visa

International students requiring a form I-20 or IAP-66 for student or exchange visa must provide certification of adequate financial resources. Generally, the student must provide an official bank statement showing the availability of the appropriate funds. If a private sponsor will be the student's source of support, the sponsor must submit a letter showing intent to sponsor and an official bank statement showing the availability of the appropriate funds. Other forms of support could include sponsorship certifications from the student's government or other sponsoring agency. In all cases, original or certified copies of financial/sponsorship documents must be submitted before the I-20 or IAP-66 can be issued.

English Proficiency/TOEFL Scores

All applicants whose first language is not English must provide proof of English language proficiency. West Virginia University uses the Test of English as a Foreign Language (TOEFL) as the measure of English language proficiency. A score of 550 on the TOEFL is the minimum required of all such applicants. Applicants must make arrangements to take the TOEFL well in advance of the desired date of enrollment at WVU. Information about registration for the TOEFL can be obtained by writing to the Educational Testing Service, P.O. Box 6154, Princeton, NJ 08541-6154, USA, or by contacting the local office of the United States Information Service (USIS).

Applicants who have received a high school diploma or a bachelor's degree in the United States need not submit TOEFL results.

Intensive English Program

In some cases, it may be possible to consider applications for students who lack adequate TOEFL scores and will enroll in the West Virginia University Intensive English Program. Such applicants must contact the intensive English program directly and notify the Office of Admissions and Records of their intentions. Applicants for graduate programs should also notify the academic department of interest of their intentions. Admission to the intensive English program does not guarantee admission to the University or to a specific program of study. Inquiries about the intensive English program should be directed to the Intensive English Program, Department of Foreign Languages, West Virginia University, P.O. Box 6298, Morgantown, WV 26506-6298.

Official Documents

West Virginia University requires the submission of original academic documents or certified copies of the original academic documents from institutions located outside of the United States. The required documents include the official academic record (showing

course titles, dates courses were taken, and grades received) and diplomas or certificates showing the degree awarded. These documents must be in the original language of issue. Official English translations must be provided with the official academic credentials in the original language. Any translation of a document must be a literal, word-for-word translation and must indicate actual grades received, not an interpretation of the grades.

Academic Records

Applicants for graduate programs must submit academic records from all post-secondary education. In some cases, it may be necessary for graduate applicants to submit records from secondary school.

Documents received by West Virginia University can not be returned to the applicant. It is therefore recommended that students who have only their original academic documents submit certified copies of their credentials with their application.

Applicants who are currently enrolled in an institution and who can not submit the final academic record and certification of degree may be granted admission if the incomplete record indicates that the applicant will unquestionably meet WVU admission standards. Final admission, however, can not be approved until the complete academic record and certification of degree have been received and evaluated by the Office of Admissions and Records.

Transferring Within USA

International students applying to transfer from schools within the United States are not permitted to register at WVU until they have complied with all transfer procedures as required by the United States Immigration and Naturalization Service (INS).

Upon arrival on the campus, the student must be prepared to present the I-20 or IAP 66 to the international student advisor for formal processing. **No student should move to Morgantown without having received an assurance of admission and immigration documents from WVU.**

Transfer Procedures

A student wishing to transfer to WVU from another institution should follow the same application procedures as those outlined for other new students.

A student wishing to apply credit earned at another institution of higher education to a master's degree at WVU must obtain a transfer of graduate credit form from the Office of Admissions and Records. This form requires the signature of the student's unit chairperson or designee. The student must also have an official transcript from the other institution sent to the Office of Admissions and Records. **Only credit earned at institutions accredited** (e.g., North Central accreditation) **at the graduate level may be transferred.** Non-degree graduate students are not permitted to transfer credit to WVU from another institution.

Credit Hours

A maximum of 12 semester hours from other institutions may be transferred for credit at WVU in master's degree programs requiring 30 to 41 semester hours. Eighteen semester hours can be accepted for master's degree programs requiring 42 or more semester hours. Individual graduate programs may accept fewer credit hours. Permission forms to apply for transfer credit must be obtained from and returned to the Office of Admissions and Records. It is strongly recommended that students have transfer credit approved prior to enrolling in course work.

Transfer to Another Program

A student may initiate a transfer to another program by contacting the dean's office of the school or college where enrolled. Following the student's request, the dean's office will send the student's record to the school or college that the student wishes to enter. The school or college receiving the record is required to acknowledge receipt of the record and notify the Office of Admissions and Records of the status of the student's application within 30 days. If a student is accepted by the new school or college, the school or college retains the student's record and notifies the student of acceptance. If a student is rejected, he or she is notified of such action, and the student's record is returned to the original school or college. The Office of Admissions and Records is responsible for updating students' records to reflect new majors and new advisors.

Internal Credit Transfers

When a student transfers from one unit or program to another unit or program within the University, the faculty of the new unit determines if any credit earned under the guidance of the prior unit may be applied to a degree, certificate, or other educational offering of the new unit.

Programs may establish admission requirements in addition to those set by the University Graduate Council, such as a higher grade-point average, the submission of scores on standardized tests, and the receipt of letters of recommendation.

Admission to Graduate Study

Classifications

Regular graduate students are degree-seeking students who meet all the criteria for regular admission to a program of their choice. The student must possess a baccalaureate degree from a college or university, must have at least a grade-point average of 2.75 on a 4.0 scale, have met all the criteria established by the degree program, and be under no requirements to make up deficiencies.

A student may be admitted as provisional by any unit when the student possesses a baccalaureate degree but clearly does not meet the criteria for regular admission. The student may have incomplete credentials, deficiencies to make up, or may have an undergraduate scholastic record which shows promise, but less than the 2.75 grade-point average required for regular admission.

A non-degree student is a student not admitted to a program. Admission as a non-degree student does not guarantee admission to any course or program. The reasons for non-degree admission may be late application, incomplete credentials, scholarship deficiencies, or lack of a degree objective. Even though a non-degree student has not been admitted to a graduate program, a unit may allow a non-degree student to enroll in its courses. **To be admitted as a non-degree student, a student must only present evidence of a baccalaureate degree and a 2.50 grade-point average, but the student must obtain a 2.50 grade-point average on the first 12 credit hours of course work and maintain this average as long as enrolled.** To be eligible to enter a degree program, the student must maintain a minimum of a 2.75 grade-point average on all course work taken since admission as a graduate student.

The standards cited are the minimum standards established by the University. Individual academic units or graduate programs may establish higher standards.

Academic Standards

The minimum academic standards for the different classifications are: **To be in good standing, regular students must obtain a 2.75 grade-point average in the first 12 hours of graduate study and maintain this average throughout the time they are**

enrolled in graduate work. A student failing to achieve this standard will be placed on probation and must achieve a cumulative grade-point average of 2.75 by the end of the next enrollment at West Virginia University. In the case of a part-time graduate student, a 2.75 cumulative grade-point average must be obtained in the next nine hours of graduate study. A student who cannot attain the required average will be suspended.

A provisional student has been admitted to the University with one or more deficiencies. Consequently, **by completion of the 18th credit hour, the student must meet the provisions stated in the letter of admission and attain a minimum grade-point average of 2.75.** A student who fails to meet the provisions of admission or who fails to achieve the required grade-point average will be suspended. Students who meet the provisions of admission and the required grade-point average will be reclassified as regular students, and the regulations governing good standing for regular students will apply.

To be in good standing, a non-degree student must obtain a 2.50 grade-point average in the first 12 hours of graduate study and maintain this average throughout the time enrolled in graduate work. A student failing to achieve this standard will be placed on probation and must achieve a cumulative grade-point average of 2.50 by the end of the next enrollment (or nine credit hours for part-time students) at West Virginia University. Students who cannot attain the required average will be suspended. A non-degree student who later wishes to apply for admission to a degree program must have achieved a minimum grade-point average of 2.75 on all course work taken since admission as a graduate student in order to be considered.

Enrollment Regulations of Non-degree Students

Non-degree students may enroll in any course in the University for which they have the prerequisites and permission from the academic unit. Some departments that cannot accommodate non-degree students may restrict enrollments to majors only or require permits. These students are normally adults taking classes for enrichment purposes, public school teachers taking classes for certification renewal, or students taking classes as prerequisites for admission to degree programs. Since these students have not made a commitment to a degree program, are not subject to time limits, and may enroll on an irregular basis, the University policies concerning active/inactive status are more liberal than those for degree students.

A non-degree graduate student may accumulate unlimited graduate credit hours, but if the student is later admitted to a degree program, the faculty of that program will decide whether or not any credit earned as a non-degree student may be applied to the degree. **Under no circumstances may a non-degree student apply more than 12 hours of previously earned credit toward a degree.**

Advising of Non-degree Students

Each dean establishes a mechanism to advise non-degree graduate students who intend to take the majority of their course work in the dean's school or college. The mechanism may be the designation of a faculty member to advise non-degree students or the assignment of non-degree students to an advising office or center. Non-degree students who express an interest in programs in two colleges may be assigned to either by the Office of Admissions and Records. It is expected that the assigned advisor will consult the other unit for information when it is needed to assist the student. Students who are truly undecided on a major or who plan to take courses in several schools or colleges for enrichment may be assigned to the Office of the Graduate Education. The number of students assigned in this manner will be quite small, and a program advisor will be assigned when a student designates a specific interest.

Previous Graduate Study

The same three admission classifications (regular, provisional, non-degree) apply to those applicants who have undertaken previous graduate study. In general, the cumulative grade-point average regulations apply to any transfer student who has not completed a graduate degree. However, an applicant having received a master's degree from an accredited college or university may be admitted to whatever category is deemed most appropriate by the faculty of the program of interest.

Reclassification of Provisional Students

The provisions of a student's provisional status are specified by the graduate department or program. To be reclassified as a regular student, a student must meet the provisions stated in the letter of admission and achieve a minimum grade-point average of 2.75 on all course work taken during the provisional period. Individual degree programs may set higher grade-point average requirements.

No later than the completion of the 18th credit hour, a unit must review the student's record and make a final decision on the student's admission. A student who has met the provisions of admission and achieved the required grade-point average will be reclassified as a regular student. A student who fails to meet the provisions of admission or who fails to achieve the required grade-point average will be suspended, but may be reinstated in order to transfer to another program or to non-degree status. The academic unit must notify the student and the Office of Admissions and Records of its decision.

Upon notification by the appropriate academic unit, the Office of Admissions and Records will prohibit the registration of all provisional graduate students who have reached the maximum of 18 credit hours. Registration will not be permitted until the student is reclassified as a regular student, an exception is granted by an academic dean, or the student is transferred. A student may be admitted as a provisional graduate student more than one time, but not by the same graduate program.

All credit hours taken since admission as a provisional graduate student or to be applied to a degree count in the 18 credit-hour limit, i.e., undergraduate or graduate credit, P/F, S/U, graded courses, credit by senior petition, and transfer credit.

Other Reclassifications

Regular and provisional students may become non-degree students by choice. This includes students who fail to meet admission or academic standards or who withdraw voluntarily. To change a student to non-degree status, the advisor must process a *Graduate Studies Transfer/Status* form through the school or college dean's office.

Non-degree students who later wish to become degree students must present all the credentials required by the degree program. This requires the processing of a *Graduate Studies Transfer/Status* form by the student's advisor through the Office of Admissions and Records. For admission to a degree program, a non-degree student must have achieved a minimum grade-point average of 2.75 on all course work taken since admission as a graduate student.

Enrollment and Registration

Credit Limitations

Credit toward a graduate degree may be obtained only for courses listed in the graduate catalog and numbered 200-499. No more than 40 percent of course credits counted toward meeting requirements of any graduate degree may be at the 200 level. No residence credit is allowed for special field assignments or other work taken off the WVU campus without prior approval. Graduate credit is obtained only for courses in which the grade earned is A, B, C, or S. No course in which the grade earned is D, P, F, or U can be counted toward a graduate degree.

Credit Overloads

Graduate students are strongly recommended by their advisors to limit their credit loads in proportion to the outside service rendered and the time available for graduate study. In general, persons in full-time service to the University or other employer are advised to enroll for no more than six hours of work in any one semester; those in half-time service are advised to enroll for no more than 12 hours. Recommended credit loads may be less for employed graduate students in some academic colleges, schools, and departments.

It is recommended that a student enroll for no more than 15 hours of graduate courses in any one semester and no more than 12 hours in the total of the two summer enrollment periods. Credit overloads may be approved for students by their advisors. Some school or college dean's offices may also choose to monitor overloads in their academic units.

Degree Progress

Students seeking master's or doctoral degrees (as determined by the student's application and letter of admission) are expected to enroll regularly and make steady progress toward their degree objectives. Students who have not taken at least one course during a period of seven terms (including summer sessions) for this period of time are deleted from active status and must reactivate their records and pay the reactivation fee. Once inactive, students may not register for classes until this fee is paid. **Master's degree students are permitted to continue in a program for a maximum of eight years under their original application.** Students who have not been active for this period of time must reapply and be readmitted. The application fee is assessed.

Current Information

The University must have current information (name, address, telephone number, major, and advisor) about students enrolling for classes in order to communicate with students and maintain permanent records. In addition, when individuals do not enroll in classes for substantial periods of time, it is costly and time consuming to continue to maintain their records on active status. For these reasons, the Office of Admissions and Records periodically deletes degree and non-degree student records from active status. Students who return after this deletion must reactivate their records and pay the program reactivation fee.

Advising

Each academic unit through which graduate degree programs are administered has one or more graduate advisors, and every graduate student is assigned an advisor at the time of admission or shortly thereafter. The advisor and student should meet before the first enrollment to begin formulation of a plan of study.

Plan of Study

Shortly after entrance into a degree program and usually before nine to twelve hours of graduate course work have been completed, a meeting is held among student, advisor, and committee (if appointed) to draw up a plan of study. Depending on the degree sought and the field of study, the plan may also contain an outline of the research problem to be undertaken. Some graduate programs have the student and committee meet at a later date to delineate the research project more formally as a prospectus for the report, thesis, or dissertation. **The plan of study is subject to mutual approval and is made a part of the student's record.** It then becomes a formal agreement between student and program faculty as to the conditions which must be met for completion of the degree requirements. **Any subsequent changes in the plan of study**

(or prospectus) can be made only through mutual agreement. When the binding nature of these documents is fully understood, there is less likelihood that later misunderstanding will arise. Thus, anyone who contemplates application for graduate work at WVU is urged to read the graduate catalog carefully and request clarification where needed. A student must be very aware of the right to express personal views in the drafting of the plan of study and/or research prospectus. Should disagreement arise at any time, the responsibility for arbitration rests with the dean of the school or college.

Records

Deans' offices maintain all records for monitoring student progress and for certifying students for graduation. Among these records are plans of study (subject to the school/college dean's approval); graduate committees (subject to the school/college dean's approval); grades; grade modifications, etc.

Required Minimum Enrollment

If a graduate student is using University libraries, research facilities, or consulting with graduate committee members, it is necessary for the student to enroll for at least one hour of graduate credit. In no other way can the University receive credit for its contribution to graduate study, attest to student status, and guarantee the protection to which the student is entitled. Students who take courses **intermittently** may be excused from such continuous enrollment if they are not using University facilities or consulting with faculty while they are not enrolled. **However, students formally admitted to candidacy for graduate degrees are required to register for at least one credit hour each semester as a condition of their continued candidacy.** By pursuing a degree at this institution, such persons by definition are utilizing University services, facilities, and other resources, including faculty expertise; this situation continues in cases where students have completed all required course work and are working on a thesis or dissertation. Candidates for graduate degrees who fail to maintain continuity of enrollment can be dropped from candidacy.

Extended Learning/Off-Campus Study

West Virginia operates six regional centers located at Charleston, Clarksburg, Parkersburg, Keyser, Shepherdstown, and West Liberty. Approximately 200 graduate courses are offered each semester at these centers. **Students wishing to take off-campus courses for graduate credit must first be admitted as graduate students using the same procedures as for on-campus study.** It is the student's responsibility to obtain from the appropriate college, school, and department the specific requirements for degree candidacy. Selected courses and degree programs are offered at the centers, including special education, communication studies, safety and environmental management, business administration, community health promotion, counseling, public health, and social work. Courses in these and other fields meet public education certification requirements as well as personal and professional development goals. A master of science in nursing is available at selected sites. A doctorate with emphasis in education administration is available in cooperation with Marshall University and the West Virginia Graduate College. Special courses may be offered at other locations in the state to meet specific needs.

Graduate courses offered are approved by the appropriate department chairpersons, academic deans, director of ELO, and by the associate provost for curriculum and instruction. Advising and scholarship standards, applicable to both on- and off-campus courses, are governed by the individual academic unit.

Information about off-campus courses is available from the program unit offering the courses, the regional centers, and the Extended Learning Office (ELO), West Everly Street, P.O. Box 6800 Morgantown, WV 26506-6800.

Enrollment During Final Semester

All graduate students must enroll for at least one credit hour during the semester (or summer) of graduation. Graduate students who are on campus will be required to register by the normal registration deadlines. Graduate students who have left the campus will be allowed to register until the tenth week of classes in fall and spring semesters and the third week of Summer-II. [Note: Quota waivers are not to be used to meet this enrollment requirement.]

Full/Part Time

A student is classified as full-time or part-time for any given enrollment period. **A graduate student is classified as full-time if enrolled for nine or more hours in a semester or six or more hours altogether in the summer.**

Auditors

Students may enroll in courses without working for a grade or for credit by registering as auditors. Change in status from audit to credit or from credit to audit may be made during the registration period. Attendance requirements for auditors are determined by the instructor of the course being audited. It is the prerogative of the instructor to strike the name of any auditor from grade report forms and to instruct the Office of Admissions and Records to withdraw the auditor from the class, if attendance requirements are not met. Auditors are required to follow the same admission procedures as students taking the course for credit.

Academic Rights

Students' academic rights and responsibilities are governed by Board of Trustees' policies and corresponding policies, rules, and regulations developed by each of the institutions in the University of West Virginia system of education. The rights and responsibilities of students at West Virginia University are published each year in the *WVU Student Handbook*. Copies of the *WVU Student Handbook* may be obtained from the Office of Student Life in Elizabeth Moore Hall.

Scholarship

Because of their familiarity to most students, letter grades are assigned in many graduate courses. However, **better than "average" performance is expected of graduate students.** They are enrolled for fewer credit hours than they were as undergraduates, 9 to 12 hours being the norm for a full-time graduate student, and are expected to spend more time on each course and achieve above average mastery of the material. A few grades of C may be tolerated in graduate programs if there are higher grades in other courses to compensate for them. **Although a grade of C is considered average performance for an undergraduate student, it is not acceptable as the norm for work produced by one who is studying for an advanced degree.**

Grading Scale

- A—excellent (given only to students of superior ability and attainment)
- B—good (given only to students who are well above average, but not in the highest group)
- C—fair (average for undergraduate students, but substandard for graduate students)
- D—poor but passing (cannot be counted for graduate degree credit)
- F—failure
- I—incomplete
- W—withdrawal from a course before the date specified in the University Calendar.

Students may not withdraw from a course after the specified date unless they withdraw from the University

WU—withdrawal from the University doing unsatisfactory work

P—pass (cannot be counted for graduate degree credit—see below)

X—auditor (no grade and no credit)

S—satisfactory

U—unsatisfactory (equivalent to D or F)

Pass/Fail

Pass/fail grading is not applicable to the course work for a graduate degree. A graduate student may register for any course (1-499) on a pass/fail basis only if the course involved is not included in the student's plan of study and does not count toward a graduate degree. The selection of a course for pass/fail grading must be made at registration and may not be changed after the close of the registration period. A student who, having taken a course on a pass/fail basis, later decides to include the course as part of a degree program must reregister for the course on a graded (A, B, C, D, or F) basis.

S/U

Courses graded S/U are approved by the associate provost for curriculum and instruction. Approved requests are forwarded to the Office of Admissions and Records for entry into the *WVU Master Course Directory*.

GPA

The grade-point average is computed on all work for which the student has registered while a graduate student, except for courses with grades of I, S, W, WU, P, and X, and is based on the following grade-point values: A = 4, B = 3, C = 2, D = 1, F = 0, and U = 0. **Only grades in courses numbered 200 and above are computed in a graduate student's grade-point average;** however, if any student receives grades lower than C for one-half or more of any course work attempted during one enrollment period, the student will be suspended.

Incompletes

When a student receives a grade of I and later removes the incomplete grade, the grade-point average is recalculated on the basis of the new grade. The grade of I is given when the instructor believes that the course work is unavoidably incomplete or that a supplementary examination is justifiable. Before any graduate degree can be awarded, the grade of I must be removed either by removal of the incomplete sometime before program completion or by having it recorded as a permanent incomplete. Only the instructor who recorded the I, or, if the instructor is no longer at WVU, the chairperson of the unit in which the course was given, may initiate either of these actions. In the case of withdrawal from the University, a student with a grade of I should discuss that grade with the appropriate instructor. If other provisions are not made, an I grade eventually converts to F. Grade changes other than I to a letter grade must be accompanied by an explanatory memo.

Grades Lower Than C

Credit hours for courses in which the grade is lower than C will not be counted toward satisfying graduate degree requirements. These standards are the minimum standards for the University. A graduate program may set higher standards which the student must meet, but these must be presented in writing to all students upon admission or published in the catalog.

Graduate Credit Via Senior Petition

Undergraduate students wishing to obtain graduate credit by senior petition must obtain the standardized permission form from the Office of Admissions and Records. This form requires the signature of the student's undergraduate advisor and the head of the unit offering the graduate course. The policies regulating an undergraduate's enrollment in the graduate-level course for graduate credit are:

- Enrollment is only permitted in courses numbered 200-399.
- Undergraduates must be within 12 credit hours of their baccalaureate degrees and have a grade-point average of 3.0 on a 4.0 scale.
- The maximum amount of graduate credit permitted by senior petition is 12 credit hours.
- The senior petition must be approved prior to or at the time of enrollment.
- No more than 20% of the total enrollment in any 300-level course may consist of undergraduate students.

Approved senior petitions are returned to the Office of Admissions and Records so that a notation of graduate credit may be placed on the student's transcript. Any exceptions to the regulations must be approved by the dean of the school or college in which the student seeks graduate credit. *Note:* **Students receiving graduate credit for a course do not receive credit toward their undergraduate degree with the same course.**

Transcripts

Each copy of a transcript costs \$3.00 in cash or money order. Two or three weeks may be required to process an application for a transcript at the close of a semester or summer term. At other times the service requires approximately 48 hours from receipt of the request. An application for a transcript of credit earned must furnish the date of last attendance at WVU and student identification number. A married woman should give both her maiden and married names. All requests for transcripts must be sent, in writing, directly to the Office of Admissions and Records; no phone requests are accepted.

Forfeited Transcripts

Students who default in the payment of any University financial obligation forfeit their right to claim a transcript until such time that the obligation has been satisfied.

Withdrawals

There are two types of withdrawals: withdrawal from some part of the work for which a student has registered, and a complete withdrawal from the University. **Unless the formal withdrawal procedures are completed, failing grades are recorded.** Withdrawals from some part of the work must have the initial approval of the student's advisor. It is the student's responsibility to see that all forms are properly executed and delivered to the appropriate authorities for recording.

Withdrawals From Classes

Until the Friday of the tenth week of class (or Friday of the fourth week in a six-week summer session, or Friday of the second week of a three-week summer session), students may withdraw from individual courses. Deadlines are published in the *WVU Schedule of Courses* each semester.

Students must obtain their advisor's signature on the University course adjustment form and submit the completed form to the Office of Admissions and Records. Before withdrawing from classes, students, with the help of their academic advisors, are responsible for determining:

- If their course load would be reduced below the minimum requirement set by their program;
- If their course load would be reduced below the minimum hours required to qualify for a graduate assistantship or financial aid or international full-time student status;
- If the course to be dropped is a corequisite to another course the student is taking or a prerequisite to a course required the following semester. If so, the student may be required to drop the corequisite course or asked to take a substitute course the following semester.

Students who withdraw from courses before the published deadline and who follow all of the established University procedures receive a W on their transcript for the appropriate course(s). The grade-point average is not affected in any way by this mark.

Withdrawals From the University

Students who decide to leave WVU should withdraw from all classes and must do so in accordance with established University policy in order that the official transcript may reflect this action. **Students are responsible for all financial obligations and for following established procedures, including the completion of forms and delivery of the completed forms to appropriate officials.** Students not fulfilling these requirements may have difficulty withdrawing from the University. The withdrawal becomes official only after the forms have been recorded by Admissions and Records. Students receive copies and are urged to keep them.

Any student (full- or part-time) may withdraw from all classes for which he/she is registered in the University any time before the last day on which regular classes are scheduled to meet as established by the University calendar and published in the *Schedule of Courses*.

Students who desire to withdraw from all remaining classes should report in person to the Office of Student Life at the main lobby information desk of Elizabeth Moore Hall. Withdrawal procedures will be explained at that time. Identification (ID) and PRT cards must be presented. Students unable to withdraw in person because of illness, accident, or other valid reasons still must notify the Office of Student Life of their intention to do so. The notification should be in writing and student ID and PRT cards must be enclosed. Students are responsible, with the help of their academic advisors, for determining how withdrawal from the University may affect their future status at the University including such aspects as suspension for failure to make progress toward a degree, violation of established academic probation, and continued eligibility for scholarship, fellowship, or financial aid.

Absences

Students and faculty have together formulated the University's policy on absences from classes. The responsibilities of student and instructor are as follows:

The student who is absent from class for any reason is responsible for work missed. Students should understand that absences may jeopardize their grades or continuance in the course. **Instructors who use absence records in the determination of grades must announce this fact to students (in writing) within the first five class meetings.** It is the responsibility of the instructor to keep an accurate record of all students enrolled. Instructors may report excessive absences to the student's dean or advisor. Students who have been absent because of illness, authorized University activities, or for other valid reasons are to have the opportunity to make up regularly scheduled examinations. As a matter of good manners, a student should inform an instructor in advance if obliged to be absent from a class meeting.

Degree Completion

Time Limit for Master's Degrees

Regulations governing admission, registration, scholarship, etc., described in the preceding sections must be followed. **At least 30 hours of graduate work planned with the student's advisory committee must be satisfactorily completed within a period of eight years immediately preceding the conferring of the degree.** A course taken more than eight years previously must be reevaluated if it is to be used towards meeting degree requirements. Reevaluation can be accomplished by submitting the following information for approval to the office of graduate education:

- A letter from the course instructor listing the criteria used to revalidate the course material.
- A copy of the student's performance on the student's revalidation examination.
- A letter from the college/school graduate coordinator and/or dean supporting the revalidation.

Research Guidelines

Any graduate student who conducts research involving experiments that utilize animals must have a protocol approved by the Animal Care and Use Committee before starting the research. Information about procedures and protocol forms may be obtained from the Office of Sponsored Programs.

Any graduate student who conducts research involving the use of human subjects must have the approval of the Institutional Review Board for the Protection of Human Subjects before starting the research. Information about procedures and approval forms may be obtained from the Office of Sponsored Programs; 617 N. Spruce Street, Morgantown, WV 26505.

Request for Degree

At the time of registration for the enrollment period in which all degree requirements are expected to be met, or at the latest within two weeks after such registration, each candidate is to submit a formal request for the conferring of the degree. This is done on an *Application for Graduation and Diploma* form obtainable from the school or college dean's office. The candidate must complete all requirements at least one week before the end of that enrollment period. If the degree is not actually earned during that term, the student must submit a new *Application for Graduation and Diploma* when registering for the term in which completion is again anticipated.

Colleges and schools are responsible for seeing that master's and doctoral students meet the minimum requirements of the University as well as any additional college or school requirements. Deans' offices are responsible for maintaining all student records necessary to certify students for graduation. Attendance at the spring Commencement is voluntary. Anyone not planning to attend should leave a complete mailing address with the Office of Admissions and Records so that the diploma can be mailed.

Graduate Committees

The **general requirements for all graduate committees** are listed in this paragraph, while the specific requirements are found in the succeeding paragraphs. The majority members of any graduate committee must be graduate faculty members. The chair of the committee must be a member of the graduate faculty. No more than one person may be a nonmember of the graduate faculty. No family member can serve on the graduate committee of his/her relative. All graduate committees are subject to the approval of the chairperson or designee of the department/division and the dean or designee of the college/school. Once a graduate committee has been officially established for a student,

it will not be necessary to alter it because of the downgrading of the graduate faculty status of member(s) of the committee.

Master's committees consist of no fewer than three members. It is recommended that at least one member of the committee be from outside the student's department. **Master's committees of students with the thesis option** must be chaired by a *regular* faculty member and the majority of the committee must be *regular* graduate faculty.

Doctoral dissertation committees consist of no fewer than five members, the majority of whom must be *regular* graduate faculty, including the chairperson. At least one member of the committee must be from a department other than the one in which the student is seeking a degree.

Final Examinations

The final examination is not to be given until the semester or summer session in which all other requirements for the degree are to be met. The student's committee chairperson must indicate in advance the time, place, and recommended examining committee members and receive clearance from the office of the school or college dean before the examination can be given. The student cannot be considered as having satisfactorily passed the final examination if there is more than one unfavorable vote among members of the examining committee. Results of each examination must be reported to the school or college dean within 24 hours. Reexamination may not be scheduled without approval of the request by the school or college dean. **All committee members are to be present for the final examination.** If an examination cannot be scheduled at a time convenient to all committee members, the dean or his/her designee may permit another faculty member to substitute for the original committee member, provided that the original committee member was not the chair. **There can be no substitute for the chair. Only one substitute is allowed, and the request for a substitute must be made in writing prior to the examination.** The request for a substitute should be signed by the committee chair, the student, and both the original faculty member and the substitute faculty member. A substitute faculty member must have the same or higher graduate faculty status as the original faculty member and represent the same academic discipline or specialization.

Theses and Dissertations

Theses and dissertations should be presented to the student's graduate advisor or committee chairperson **at least one month** before the end of the enrollment period in which completion of all requirements is expected. The form prescribed in the *Regulations Governing the Preparation of Dissertations and Theses* must be followed with the guidance of the student's graduate advisor or the chairperson of the committee. For the manuscript to be approved, there must be no more than one unfavorable vote among members of the student's committee.

Two copies with original signatures in approved typewritten form (master's theses in bound form and doctoral dissertations unbound) must be delivered to the Charles C. Wise, Jr. Library **at least one week** before the close of the period in which the degree is expected to be completed (one week before the end of the second summer session, by the last day of the final examination period at the end of the first semester, or one week before Commencement Day at the end of the second semester).

Doctoral Degree – Specific Requirements

The program of doctoral study is planned with the student's graduate advisor and committee to combine any or all of the following: graduate courses of instruction, special seminars, independent study, supervised research, and supervised training designed to promote a broad and systematic knowledge of the major field and to prepare the student for the comprehensive qualifying and final examinations and writing of the dissertation.

The doctorate is a research or performance degree and does not depend on the accumulation of credit hours. The three requirements of the degree are admission to candidacy, residency, and completion and defense of a dissertation. The degree signifies that the holder has the competence to function independently at the highest level of endeavor in the chosen profession. Hence, the number of years involved in attaining or retaining competency cannot be readily specified. Rather, it is important that the doctoral student's competency be assessed and verified in a reasonable period of time **prior** to conferral of the degree, **generally five years.**

Graduate education, especially at the doctoral level, involves many learning experiences which take place outside the formal classroom setting. These involve observing and participating in activities conducted by the graduate faculty, using departmental and University libraries, attending lectures presented by visiting scholars, informal debates with fellow students, and similar activities. To insure that graduate students experience these kinds of informal learning, **doctoral programs at WVU as elsewhere generally require one year in residence in full-time graduate study.** However, because of the contractual nature of graduate study, an individual student or graduate committee may propose an alternative plan by which the student can gain equivalent educational experience. For example, the plan of study may require the student to spend time in residence at a national or foreign laboratory, institute, archive, or research center as partial fulfillment of the residency requirement.

Regulations governing admission, registration, scholarship, etc., described in the preceding sections must be followed. In addition, the student must satisfy requirements specified by the faculty responsible for the major field. **Students applying for admission to a doctoral program, after having received a master's degree at WVU, must file a new application for graduate work with the Office of Admissions and Records.**

Competence in one or more foreign languages is a common requirement in graduate degree programs. The faculty in the graduate degree program specify the language or languages and the level of competence to be demonstrated. Language examinations are arranged by the foreign language examiner, who can be contacted through the Department of Foreign Languages, and under whose direction language examinations are administered.

When only reading competence is required, the foreign language examiner may waive the examination in those cases where the student's transcript shows, at a date that proves to fall no earlier than seven years before promotion to doctoral candidacy, either completion of 12 semester hours or equivalent course work in an approved foreign language, with a grade of B or better in the last three hours; or at WVU, completion of French 306, German 306, or Russian 306 with a grade of B or better must be achieved.

Admission to graduate study and enrollment in graduate courses does not of itself imply acceptance of the student as a candidate for a doctoral degree. This is only accomplished by satisfactorily passing a comprehensive or qualifying examination (either oral, or written, or both) and by meeting specified language and/or other requirements.

Candidacy

A student will be given a comprehensive examination to demonstrate knowledge of the important phases and problems of the field of major study, their relation to other fields, and the ability to employ the instruments of research. The examination is intended to determine whether the student has the academic competence to undertake independent research in the discipline, and to insure that the student possesses a thorough grasp of the fields outlined in the plan of study. The examination, which consists of a series of tests covering all areas specified in the plan of study, is administered after most formal studies have been completed. Scheduling and results of the examination must be

reported to the school or college dean. It must be the consensus of the doctoral committee that the student has passed the examination, although the committee may permit one dissenting vote. A single portion of the examination may be repeated at the discretion of the committee, but if two or more members are dissatisfied, the entire qualifying examination must be repeated. The student must petition through the doctoral committee in order to be permitted to repeat a qualifying examination, and it is anticipated that a waiting period will be specified by the committee during which the student will have an opportunity to correct deficiencies. Academic tradition does not allow a qualifying examination to be administered more than three times.

Time Limit

Because the qualifying examination attests to the academic competence of the student who is about to become an independent researcher or practitioner, the examination cannot precede the degree by too long a period of time. **Consequently, doctoral candidates are allowed no more than five years in which to complete remaining degree requirements.** In the event a student fails to complete the doctorate within five years after admission to candidacy, an extension of time can be obtained only by repeating the qualifying examination and meeting any other requirements specified by the student's committee.

Dissertation Research

The candidate must submit a dissertation pursued under the direction of the faculty of the University on some topic in the field of the major subject. The dissertation must present the results of the candidate's individual investigation and must embody a definite contribution to knowledge. While conducting research or writing a dissertation, the student must register at the beginning of each semester or summer during which credit is being earned. No residence credit will be allowed for special field assignments or other work taken off the University campus without prior approval by the associate provost for curriculum and instruction.

Final Examination

The final examination is not given until the semester or summer session in which all other requirements for the degree are to be met. After the candidate's dissertation has been tentatively approved, the final oral examination on the dissertation can be scheduled. At the option of the faculty responsible for the degree program, a comprehensive final written examination also may be required. The student's committee chairperson must indicate in advance the time, place, and recommended examining committee members and receive clearance from the office of the school or college dean before the examination can be given. Such notifications of doctoral examinations must be received at least three weeks before the examination date. All doctoral final oral examinations are open examinations and the lead time is required for public notice to the University community.

The student cannot be considered as having satisfactorily passed the final examination if there is more than one unfavorable vote among members of the examining committee. Results of each examination must be reported to the school or college dean within 24 hours. Reexamination may not be scheduled without approval of the request by the school or college dean. All committee members are to be present for the final examination. If an examination cannot be scheduled at a time convenient to all committee members, the dean or his/her designee may permit another faculty member to substitute for the original committee member, provided that the original committee member was not the chair. There can be no substitute for the chair. Only one substitute is allowed, and the

request for a substitute must be made in writing prior to the examination. The request for a substitute should be signed by the committee chair, the student, and both the original faculty member and the substitute faculty member. A substitute faculty member must have the same or higher graduate faculty status as the original faculty member and represent the same academic discipline or specialization.

Dissertation Submission

The requirements for a doctorate include acceptance of the dissertation. The dissertation must bear the original signatures of at least all but one of the committee members. If more than one member of the committee, whatever the size of the committee, dissents from approving the dissertation, the degree cannot be recommended. If a substitute faculty member attends the final examination, the substitute signs the shuttle sheet; however, the original committee member is to sign the dissertation. The dissertation must be presented to the University not later than one week before the end of the semester or summer session in which the degree is expected to be granted (one week before the end of the summer, by the last day of the final examination period at the end of the first semester, or one week before Commencement Day at the end of the second semester).

All doctoral dissertations and their abstracts will be microfilmed through University Microfilms, Ann Arbor, Michigan. This requirement will not be satisfied by any other publication but does not preclude publication elsewhere, which is both permitted and encouraged. Candidates are to follow *Regulations Governing the Preparation of Dissertations and Theses* regarding format and organization of the dissertation, which is on file at the department offices, offices of all graduate advisors, and the University libraries. The candidate is required to maintain close contact with the supervisor or chairperson of the graduate committee on these matters in developing a dissertation so as to incorporate the special requirements of the subject discipline.

One week before the close of the semester or summer in which the degree is expected to be conferred the candidate must meet these requirements:

1. Submit in a form satisfactory for microfilming, an appropriately printed, unbound original and one copy of the dissertation. Two excellent machine-reproduced copies may be acceptable. Both copies must have original signatures of the candidate's committee.
2. Submit one extra abstract of no more than 350 words. This separate abstract must have at the top of the first page the centered exact title of the dissertation, followed on the next line by the full name of the candidate, and on the next line by the word ABSTRACT. The extra abstract is on unnumbered pages.
3. Submit a microfilm contract completed and signed by the candidate.
4. Pay a fee of \$50.00 to cover the cost of microfilming the dissertation and publication of the abstract in *Dissertation Abstracts*, a bi-monthly journal which receives wide distribution. This fee is payable by certified check or money order made out to "West Virginia University." If desired, copyright service can be provided through WVU upon receipt, along with the dissertation, of a certified check or money order for \$35.00 made payable to University Microfilms.
5. Complete the questionnaire entitled *Survey of Earned Doctorates*.

Summary of Doctoral Requirements

1. Shortly after admission to the program (usually within the first 9-12 semester hours of course work), an advisory committee is formed and the committee and the student produce a plan of study.
2. Student completes requisite course work and other program requirements, satisfying also the stipulated residency requirement.
3. Student takes the language examination (if applicable).

4. Student takes written and/or oral comprehensive (qualifying) examination for admission to candidacy. The results are communicated to the appropriate office by the student's graduate program advisor.

5. Student undertakes a doctoral dissertation under the guidance of a dissertation committee. The dissertation phase begins with approval of a dissertation prospectus by the dissertation committee, the department chairperson, and the school or college dean.

6. A copy of the preliminary draft of the dissertation is given to each committee member at least one month prior to the final oral examination.

7. The dissertation advisor (committee chairperson) requests a clearance for the final examination from the school or college dean's office **no later than three weeks** before the scheduled date.

8. The time and place of the examination is announced.

9. The student defends the dissertation in an oral defense.

10. The student delivers two copies of the approved dissertation, appropriate questionnaires, and fees to the Charles C. Wise, Jr. Library.

Summary of Master's Requirements

1. Shortly after admission to the program (usually within the first 9-12 semester hours of course work), an advisory committee is formed and the committee and the student produce a plan of study.

2. Student completes requisite course work and other program requirements.

3. Student confers with advisor and, if applicable, chairperson of thesis committee to see if all requirements can be met by the end of the semester in which he/she plans to graduate. This should be done no later than the beginning of the final semester.

4. Student registers for either a course or for the Non-Enrolled Graduate Student Evaluation Fee (\$50). No one may graduate who is not registered as a student during the semester of graduation.

5. Student checks with the University to insure that there is correspondence between departmental and University records and that there are no remaining deficiencies.

6. Student completes an *Application for Graduation and Diploma*. This should be done no later than two weeks after registration.

7. After getting a fee slip from the Office of Admissions and Records, the student pays the \$20 graduation fee at the cashier's window in the Mountainlair.

8. (*If applicable*) The student presents a typed draft of the thesis to each committee member.

9. The student should remind the committee chairperson to request clearance from the school or college dean's office at least two weeks before the date of the final examination (or thesis defense).

10. Results of the final examination (or thesis defense) must be reported to the dean's office by the graduate advisor or the committee chairperson not later than one week before the end of the semester or summer session in which the degree is expected to be granted.

11. If the requirements for the master's degree include a thesis, the thesis must bear the original signatures of at least all but one of the committee members. If more than one member of the committee, whatever the size of the committee, dissents from approving the thesis, the degree cannot be recommended. If a substitute faculty member attends the final examination, the substitute signs the shuttle sheet; however, the original committee member signs the thesis.

12. Two bound and originally signed copies of the thesis (the original and first copy or two electrostatically-reproduced copies) must be submitted to the Charles C. Wise, Jr. Library no later than one week before the degree is expected to be granted.

Part 3 Facilities, Fees, and Financial Aid

Facilities

The WVU campuses combine traditional and modern architectural styles, and eleven campus buildings are listed on the National Register of Historic Places. Many of these original buildings, including Stalnaker Hall, have recently been restored and renovated.

A new Campus Master Plan is underway in 1996. Completion of this monumental task will set the stage for numerous changes over the next 10-20 years. New buildings, departmental moves, and major renovations are expected. This will respond to institutional demands for increased efficiency related to facility space management.

In May 1995, ground breaking ceremonies were held for the WVU Westvaco Natural Resources Center. Scheduled for completion in late 1996, the center will provide classroom and research facilities in the heart of the 7,800 acre University Forest.

Major projects to be completed soon include: Woodburn promenade, Armstrong renovation, new parking lot near Evansdale greenhouse, and a new Rugby field for intramural sports.

Parts of the campus are linked by the Personal Rapid Transit (PRT) system, which consists of computer-directed, electronic-powered cars that operate on a concrete and steel guideway, permitting quick and easy access to major locations within the University and the downtown area of Morgantown.

Greater Morgantown, with a population of 45,000, is located on the east bank of the Monongahela River in the rolling hills of northern West Virginia. Morgantown is within easy traveling distance of metropolitan areas: Pittsburgh is 75 miles to the north, and Baltimore and Washington, D.C., are 200 miles to the east. Two major highways, Interstates 79 (north/south) and 68 (east/west), pass near Morgantown.

Of the nearly 20,000 students enrolled on the Morgantown campuses, most undergraduates are housed in the University-owned residence halls, and many married students and single graduate students live in University apartments. Approximately 3,000 students live in privately owned residence halls and fraternity and sorority houses; many commute from their parents' homes, and the rest live in apartments, mobile homes, and private rooms.

The University Housing and Residence Life Office, G-18 Evansdale Residential Complex (phone 304-293-2811), provides information concerning University-owned housing. The student life office in Elizabeth Moore Hall provides information concerning privately owned, off-campus housing (phone 304-293-5611). Listings for privately owned rentals change daily so students should visit the Office of Student Life to see what is available and make their own arrangements with landlords. Good housing is plentiful, both in residence halls and private apartments. Because of the terrain, parking is limited on the WVU campuses and in the city.

The West Virginia University Libraries contain over a million volumes and two million microforms. Some 20,000 volumes are added each year, and 9,000 periodical titles are received. The collections are especially strong in the biological sciences, chemistry, economics, Africana, Appalachian resources, the Health Sciences, and West Virginia History. The libraries are a federal regional depository for government information and patent and trademark information. Facilities for research in West Virginia and regional history are centered in the West Virginia Collection Library, on the second floor of Colson Hall. In addition to an extensive collection of books, periodicals, and maps, the West Virginia Collection Library contains over five million manuscripts. These, together with court records from many counties, are invaluable sources for the study of all aspects of West Virginia and Appalachian history. The rare book room contains an unusually fine collection of first and limited editions, including four Shakespeare folios and first editions of many of the works of Dickens, Scott, and Clemens.

The Evansdale Library houses the collections needed to support the schools and colleges on the Evansdale Campus: Agriculture, Engineering and Mineral Resources, Human Resources and Education, Social Work, Physical Education, and Creative Arts.

Discipline-specific libraries serve particular areas. The physical sciences library of 37,000 volumes in the fields of chemistry, geology, geography, physics, and astronomy is in the Chemistry Research Laboratory. The Health Sciences Center library on the second floor of the Basic Sciences Building contains over 150,000 volumes and multimedia materials. The law library, with a collection of over 130,000 volumes, is in the Law Center on the Evansdale Campus. The mathematics library in Armstrong Hall contains approximately 16,000 volumes. The music library in the Creative Arts Center contains some 23,000 items, including microcards, microfilms, sound recordings, books, scores, and journals.

The Audiovisual Library located in Colson Hall contains an extensive collection of films, videos, and other multimedia to support the curriculum.

The libraries are fully automated, providing access to more than 32 CD-ROM databases, 10 of the Wilson indexes, Current Contents, NIM, and internet resources. Access to the online electronic resources is available via faculty offices, all computer labs, and remotely, using modems. The libraries are open 98 hours per week and most holidays.

The Office of Disability Services is located at 215 Student Services, phone 304-293-6700. It helps qualified students with disabilities to reach their academic potential. Its services and accommodations are in keeping with our commitment to provide both architectural and programmatic accessibility. Information provided to Disability Services is treated as confidential and is not released without the student's prior consent.

Disability Services provides information, referral, and counseling services not only for students with visible impairments but also for students with less apparent disorders such as diabetes, cardiovascular problems, learning disorders, asthma, allergies or epilepsy. Also served are persons with a temporary disability such as a sprained ankle, a broken arm, or a hospitalization. The following are some of the services this office provides:

- Liaison between students and faculty.
- Individual and group counseling.
- Vocational/career information and referral.
- Information for faculty on teaching strategies and alternative testing methods for students.
- Provision of interpreters, readers, tutorial referrals, notetaking strategies, and special equipment.
- Transportation assistance, if eligible, to and from residence (within city limits) and class.

Prospective students with disabilities should contact WVU Admissions and Records (304-293-2124) and the graduate program of interest for specific information concerning application procedures and admission requirements. All students admitted to WVU are expected to meet current admission requirements.

West Virginia University Computing Services and West Virginia Network for Educational Telecomputing (WVNET) provide hardware and software for all colleges and schools in the state. WVU Computing Services coordinates these resources and provides additional services on the WVU campuses.

WVNET hardware includes an IBM 3081KX with 48 megabytes of real memory, an IBM 3081D with 16 megabytes of real memory, and a Digital Equipment VAX 8650 (48 megabytes), a VAX 8550 (48 megabytes), and an 11/780 (16 megabytes) in a VAX cluster for a total of five gigabytes of on-line disk space. Direct access for the IBM systems are from a dual density 3380E disk drive and from twelve STC 8380s. The disk drives for the Digital Equipment units are RA81s. Tape drives are STC 3420 model 6; WVNET supports 6250 and 1600BPI recording densities. Printers include three STC

IMPACT 1500s, an IBM 3820 laser, a Zeta 3600X plotter, and microfilm/fiche processors and duplicators.

Languages include COBOL, FORTRAN, PL/1, Ada, BASIC, C, and Pascal. Software include the International Mathematical and Statistics Library, the North Carolina State Statistical Analysis System, the UCLA Biomedical Package, the University of Chicago's Statistical Package for the Social Sciences, the Stanford Public Information Retrieval System, and forms of special purpose engineering software.

Residency Policy for Admission and Fee Purposes

The following is quoted from the *Policy Regarding Residency Classification of Students for Admission and Fee Purposes*, policy bulletin number 34, published by the West Virginia Board of Trustees.

2.1 Students enrolling in a West Virginia public institution of higher education shall be assigned a residency status for admission, tuition, and fee purposes by the institutional officer designated by the President. In determining residency classification, the issue is essentially one of domicile. In general, the domicile of a person is that person's true, fixed, permanent home and place of habitation. The decision shall be based upon information furnished by the student and all other relevant information. The designated officer is authorized to require such written documents, affidavits, verifications, or other evidence as is deemed necessary to establish the domicile of a student. The burden of establishing domicile for admission, tuition, and fee purposes is upon the student.

2.2 If there is a question as to domicile, the matter must be brought to the attention of the designated officer at least two weeks prior to the deadline for the payment of tuition and fees. Any student found to have made a false or misleading statement concerning domicile shall be subject to institutional disciplinary action and will be charged the nonresident fees for each academic term theretofore attended.

2.3 The previous determination of a student's domiciliary status by one institution is not conclusive or binding when subsequently considered by another institution; however, assuming no change of facts, the prior judgment should be given strong consideration in the interest of consistency. Out-of-state students being assessed resident tuition and fees as a result of a reciprocity agreement may not transfer said reciprocity status to another public institution in West Virginia.

3.1 Domicile within the state means adoption of the state as the fixed permanent home and involves personal presence within the state with no intent on the part of the applicant or, in the case of a dependent student, the applicant's parent(s) to return to another state or country. Residing with relatives (other than parent(s)/legal guardian) does not, in and of itself, cause the student to attain domicile in this state for admission or fee payment purposes. West Virginia domicile may be established upon the completion of at least twelve months of continued presence within the state prior to the date of registration, provided that such twelve months' presence is not primarily for the purpose of attendance at any institution of higher education in West Virginia. Establishment of West Virginia domicile with less than twelve months' presence prior to the date of registration must be supported by evidence of positive and unequivocal action. In determining domicile, institutional officials should give consideration to such factors as the ownership or lease of a permanently occupied home in West Virginia, full-time employment within the state, paying West Virginia property tax, filing West Virginia income tax returns, registering of motor vehicles in West Virginia, possessing a valid West Virginia driver's license, and marriage to a person already domiciled in West Virginia. Proof of a number of these actions shall be considered only as evidence which may be used in determining whether or not a domicile has been established. Factors militating against the establishment of West Virginia domicile might include such considerations as the student not being self-supporting, being claimed as a dependent on federal or state income tax returns or the

parents' health insurance policy if the parents reside out of state, receiving financial assistance from state student aid programs in other states, and leaving the state when school is not in session.

4.1 A dependent student is one who is listed as a dependent on the federal or state income tax return of his/her parent(s) or legal guardian or who receives major financial support from that person. Such a student maintains the same domicile as that of the parent(s) or legal guardian. In the event the parents are divorced or legally separated, the dependent student takes the domicile of the parent with whom he/she lives or to whom he/she has been assigned by court order. However, a dependent student who enrolls and is properly classified as an in-state student maintains that classification as long as the enrollment is continuous and that student does not attain independence and establish domicile in another state.

4.2 A nonresident student who becomes independent while a student at an institution of higher education in West Virginia does not, by reason of such independence alone, attain domicile in this state for admission or fee payment purposes.

5.1 A person who has been classified as an out-of-state student and who seeks resident status in West Virginia must assume the burden of providing conclusive evidence that he/she has established domicile in West Virginia with the intention of making the permanent home in this state. The intent to remain indefinitely in West Virginia is evidence not only by a person's statements, but also by that person's actions. In making a determination regarding a request for change in residency status, the designated institutional officer shall consider those actions referenced in Section 3 above. The change in classification, if deemed to be warranted, shall be effective for the academic term or semester next following the date of the application for reclassification.

6.1 An individual who is on full-time active military service in another state or foreign country or an employee of the federal government shall be classified as an in-state student for the purpose of payment of tuition and fees, provided that the person established a domicile in West Virginia prior to entrance into federal service, entered the federal service from West Virginia, and has at no time while in federal service claimed or established a domicile in another state. Sworn statements attesting to these conditions may be required. The spouse and dependent children of such individuals shall also be classified as in-state students for tuition and fee purposes.

6.2 Persons assigned to full-time active military service in West Virginia and residing in the State shall be classified as in-state students for tuition and fee purposes. The spouse and dependent children of such individuals shall also be classified as in-state students for tuition and fee purposes.

7.1 An alien who is in the United States on a resident visa or who has filed a petition for naturalization in the naturalization court, and who has established a bona fide domicile in West Virginia as defined in Section 3 may be eligible for in-state residency classification, provided that person is in the State for purposes other than to attempt to qualify for residency status as a student. Political refugees admitted into the United States for an indefinite period of time and without restriction on the maintenance of a foreign domicile may be eligible for an in-state classification as defined in Section 3. Any person holding a student or other temporary visa cannot be classified as an in-state student.

8.1 A person who was formerly domiciled in the state of West Virginia and who would have been eligible for an in-state residency classification at the time of his/her departure from the state may be immediately eligible for classification as a West Virginia resident provided such person returns to West Virginia within a one-year period of time and satisfies the conditions of Section 3 regarding proof of domicile and intent to remain permanently in West Virginia.

9.1 Each institution shall establish procedures which provide opportunities for students to appeal residency classification decisions with which they disagree. The decision of the

designated institutional official charged with the determination of residency classification may be appealed in accordance with appropriate procedures established by the president of the institution. At a minimum, such procedures shall provide that:

9.1.1 An institutional committee on residency appeals will be established to receive and act on appeals of residency decisions made by the designated institutional official charged with making residency determinations.

9.1.1a The institutional committee on residency shall be comprised of members of the institutional community, including faculty and student representatives, and whose number shall be at least three, in any event, an odd number. The student representative(s) shall be appointed by the president of the institutional student government association while the faculty representative(s) shall be selected by the campus-wide representative faculty organization.

9.1.1b The student contesting a residency decision shall be given the opportunity to appear before the institutional committee on residency appeals. If the appellant cannot appear when the committee convenes a meeting, the appellant has the option of allowing committee members to make a decision on the basis of written materials pertaining to the appeal or waiting until the next committee meeting.

9.1.2 The residency appeal procedures will include provisions for appeal of the decision of the institutional committee on residency appeals to the president of the institution.

9.1.3 Residency appeals shall end at the institutional level.

Fees and Expenses

All West Virginia University fees are subject to change without notice. A nonrefundable special service fee of \$35 must accompany the application for admission to graduate studies. All fees are due and payable to the controller on the days of registration. Completion of arrangements with the controller's office for payment from officially accepted scholarships, loan funds, grants, or contracts shall be considered sufficient for acceptance of registration. Fees paid after regular registration must be paid to the University cashier. Any student failing to complete registration on regular registration days is subject to a late registration fee.

At registration, students pay the fees shown in the fee charts, plus special fees and deposits as required. No degree is conferred upon any candidate and no transcripts are issued to any student before payment is made of all tuition, fees, and other indebtedness to any unit of the University.

Regulations

It is the policy of West Virginia University to place on restriction students who have outstanding debts to a unit or units of the University. The restriction may include, but is not limited to, the withholding of a student's registration, diploma, or transcript. Persons who are neither registered as University students nor members of its administrative or teaching staffs shall not be admitted to regular attendance in University classes.

Off-Campus/Music/Lab Fees

Fees for credit hours for off-campus students are the same as those charged students enrolled on-campus. Off-campus students do not pay the Daily Athenaeum fee, the radio station fee, or the Mountainlair construction fee. All students must pay a \$50 course fee for each off-campus course taken. Students taking courses offered by the College of Business and Economics pay a \$99 per three credit hour course fee.

Off-campus-only students are not assessed special fees, but they are charged \$33.00 per credit hour for each off-campus course and television course

Consult specific departmental sections of this catalog concerning nonrefundable deposits and microscope rentals.

All music majors must pay a fee of \$15.00 per semester, which entitles them to assigned practice space one hour per day. Additional space may be available at the rate of \$4.00 per hour. Band and orchestra instruments may be rented by the semester for \$10.00.

Auditors

Students may enroll in courses without working for grade or for credit by registering as auditors and by paying full fees.

Waivers

According to legislation passed by the West Virginia Legislature in 1983, WVU is limited in the number of graduate and professional waivers that can be awarded each school year. According to Board of Trustees Policy Bulletin No. 49, WVU must give priority consideration in awarding these waivers to students who are West Virginia residents and also to faculty and staff of West Virginia public and private colleges and universities.

Academic deans, directors, and vice presidents of other University of West Virginia Board of Trustees institutions are charged with responsibility of awarding tuition waivers. Students should contact the appropriate person in their department, school, or college for information regarding applications and priorities.

Student Refund Policy

Note: This policy was revised 12/22/94 and is subject to change.

Students withdrawing from the University or dropping courses below full-time status **within the refund period** are eligible for a tuition and fee refund. Every effort is made to process refunds within 30 days.

Refund of Fees

Withdrawals To withdraw officially and receive a refund, a student must apply at the Office of Student Life. Semester fees are refundable as follows:

1. Tuition, special, and refundable miscellaneous fees – Refundable based on date of withdrawal and student status.* Refer to refund schedule.
2. Optional health service fee – Refundable based on date of withdrawal and student status.* Refer to refund schedule.
3. Lab fees – Refundable during the first week of classes only based on student status.* Refer to refund schedule.
4. Nonrefundable miscellaneous fees (includes application, transcript, graduation, late registration/payment, and reinstatement fees) – These fees are nonrefundable.
5. Room and board – The unused portion of room and board is refunded on a pro rata basis, based on the date the student's belongings are removed from the room and the meal ticket/ID and room keys are surrendered.

Exceptions: Students called to the armed services of the United States may be granted full refund of refundable fees, but no course credit, if the call comes before the end of the first three-fourths of the semester. If the call comes thereafter, full credit of course(s) may be granted provided the student is maintaining a passing mark at time of departure for military services.

Students withdrawn due to catastrophic illness or death will be provided a refund as approved by the dean of student life or his/her designee.

*Students enrolled for their first semester at West Virginia University (or who received a 100% refund for previous semester) and who received Title IV aid are refunded per federal regulations. Federal regulations require refunds to be figured using both state (Board of Trustees Series #22) and statutory pro rata (Higher Education Amendments of 1992) calculations. After figuring both refunds, the calculation that provides the largest refund is given.

Dropped Courses

To drop a course(s) and receive a refund, a student must apply at the Office of Admissions and Records. If a student drops below full time status (12 hours for undergraduate and 9 hours for graduates), semester fees are refundable as follows:

1. Tuition, special and refundable miscellaneous fees – Refundable based on date of dropped course(s). Refer to refund schedule.
2. Optional health service fee – Fee is nonrefundable.
3. Lab fees – Refundable at 100% **during the first week of classes only** and nonrefundable thereafter.
4. Nonrefundable miscellaneous fees (includes application, transcript, graduation, late registration/payment, and reinstatement fees) – These fees are nonrefundable.

Refund Schedule

Fall/Spring Semester (16 week session)

Refund Period	BOT*	HEA**	Refund Period	BOT*	HEA**
1st week	90%	90%	9th week		40%
2nd week	90%	80%	10th week		
3rd week	70%	80%	11th week		
4th week	70%	70%	12th week		
5th week	50%	60%	13th week		
6th week	50%	60%	14th week		
7th week		50%	15th week		
8th week		50%	16th week		

Summer Semester (6 week session)

Refund Period	BOT*	HEA**
Day 1 thru 4	90%	80%
Day 5	70%	80%
Day 6 thru 8	70%	60%
Day 9 and 10	50%	60%
Day 11 and 12	50%	50%
Day 13 thru 15		50%
Day 16 thru 30		

Summer Semester (3 week Session)

Refund Period	BOT*	HEA**
Day 1 and 2	90%	60%
Day 3 and 4	70%	60%
Day 5	50%	60%
Day 6	50%	60%
Day 7 thru 15		

Summer Semester (2 week session)

Refund Period	BOT*	HEA**
Day 1 and 2	90%	50%
Day 3	70%	50%
Day 4	50%	50%
Day 5 thru 10		

Summer Semester (1 week session)

Refund Period	BOT*	HEA**
Day 1	90%	
Day 2	70%	
Day 3		
Day 4 and 5		

* Board of Trustees Series #22: Percent = number of days in term times percent of term allocated for refund (refer to BOT Series #22). If the percent calculation identifies a partial day, the entire day is included in the higher refund period.

** Higher Education Amendments of 1992: Percent = number of weeks remaining in the enrollment period divided by total number of weeks in the enrollment period (rounded down to nearest 10%).

Non-Sufficient Funds Check Policy

A service charge of \$10 will be collected on each check returned unpaid by the bank upon which it is drawn. If the check returned by the bank was in payment of University and registration fees, the controller's office shall declare the fees unpaid and registration cancelled if the check has not been redeemed within three days from date of written

notice. In such a case the student may be reinstated upon redemption of the check, payment of the \$10 service charge, the reinstatement fee of \$10, and the late payment fee of \$20.

Payments of tuition, fees, and other charges by check are subject to WVU's non-sufficient funds check policy. A copy of the policy is available in the bursar's office.

Financial Aid

The Student Financial Aid Office estimates that the total cost of attending WVU for a nine-month academic year is \$9,300 for single West Virginia residents living on or off-campus and \$6,700 for those living at home; \$13,385 for single nonresidents living on or off-campus and \$10,600 for those living at home. These typical estimated student budgets include tuition and fees, books and supplies, room, board, transportation, and personal expenses that provide for a modest but adequate life-style

Assistantships

West Virginia University annually awards about 1,500 graduate assistantships supported from state appropriations, federal funds, private grants, and contracts; and about 200 fellowships and traineeships derived from federal agencies and from industries and private foundations. Fellowships are awarded on the basis of academic merit and require no service in return. Graduate fellows are expected to spend full time in pursuit of their studies, but may teach to the extent that the particular degree program requires. Most traineeships, provided through institutional grants, are also for full-time study without scheduled duties.

All graduate assistants and fellows are required to be full-time (nine hours or more) graduate students. The individual is primarily a student and secondarily an employee. Tuition and registration fees generally are remitted upon application. Awards are made by degree programs or by the nonacademic unit where service is to be rendered. Applications should be made to the dean or director concerned or to the chairperson of the program in which the graduate work will be pursued. Early application is strongly recommended. Students may hold only one appointment as a graduate assistant per term.

Remission of Fees

Students appointed as graduate assistants are eligible to apply for remission of tuition and certain fees. Tuition and some fees are generally remitted or paid for fellows and trainees. All students must pay the Mountainlair construction, radio station, and Daily Athenaeum fees, but graduate assistants, fellows, and trainees are granted the option with regard to the remainder of the institution activity fee.

Students may not hold more than the total equivalent of one assistantship. This rule applies even if the appointment comes from several sources (e.g., graduate teaching assistantship, graduate research assistantship, graduate administrative assistantship, graduate residence hall assistantship, and/or teaching fellow).

Terms of Employment

Stipends for graduate assistantships are generally stated in terms of nine- or twelve-month appointments and require service to the institution. The term of service normally runs from August 15 to May 15 for nine-month appointments or from August 15 to December 31 for the fall semester or January 1 until May 15 for spring semester. The total hours of work, as well as the particular days of service (e.g., weekends and/or holidays) required, must be made clear to the student by the appropriate graduate department at the time of assigning the assistantship.

Teaching Assistant

A person who holds a graduate teaching assistantship is obligated to the extent of teaching two three-hour courses per semester, or for the equivalent in laboratory classes, or for other forms of departmental assistance, except research assistance, amounting to a minimum of 12 clock hours per week.

Research Assistant

A research assistant is one whose duties consist of assisting in the research of a faculty member with an obligation of not less than 15 or more than 20 clock hours per week in any semester.

Administrative Assistant

A student employed as a graduate administrative assistant works part time in one of the administrative offices of WVU. Assistantships obligate the student to no less than 12 or more than 20 hours of work per week in any semester.

Residence Assistants (Department of Housing and Residence Life)

Resident assistant positions are available for single undergraduate and graduate students. There are nine University-supervised residence halls which house approximately 3,600 first-year and upper-class residents. Resident assistants are required to provide educational, cultural, recreational, and social opportunities and programs for their residents. Remuneration for resident assistant positions is room, board, and a monthly stipend. Graduate students may also receive a tuition waiver for a few, specialized, live-in positions.

To obtain further information about the resident assistant recruitment and selection process, write to the assistant director for residence life, G-106, Bennett Tower, P.O. Box 6430, West Virginia University, Morgantown, WV 26506-6430.

Advising Center Assistant

Assistantships are available through the University Advising Center for students who have been admitted to a graduate program. Those who are accepted will provide academic advising services to freshman and sophomore students. A stipend is paid and the graduate student is eligible to apply for waiver of tuition and registration fees. Contact the director of the University Advising Center in the Student Services Center for information and applications.

Teaching Fellow

A teaching fellow is an advanced graduate student, usually in a doctoral program, who would qualify for a junior faculty position if that person were not a graduate student at WVU. A teaching fellow may be given major responsibilities for the design and/or operation of a course, whereas such responsibility is not placed on a graduate teaching assistant.

Swiger Fellowships

Arlen G. and Louise Stone Swiger have been special benefactors to WVU in their establishment of this fellowship program through the West Virginia University Foundation, Inc. Both were WVU graduates. Arlen G. Swiger, a successful New York attorney, bequeathed to the University half of his estate which became available to the WVU Foundation upon the death of his widow, Louise Stone Swiger. These fellowships are open to doctoral students. Selection is competitive on the basis of academic merit. Application

should be made early in the year preceding the year of anticipated enrollment in a doctoral program. Inquiries should be directed to the Office of Graduate Education.

W. E. B. DuBois Fellowships

Dr. William Edward Burghardt DuBois was born in 1868. He was educated at Fisk University and received his Ph.D. from Harvard University in 1896. Dr. DuBois was one of the founders of the National Association for the Advancement of Colored People and the Pan-African Congress Movement. Author of many historical and analytical studies of American and African society, his example provides a standard of excellence for scholarship in any discipline and an especially inspiring model for black scholars. Because of the achievements of Dr. DuBois, West Virginia University has named this fellowship program in his honor. The fellowships are open to black graduate and professional students who are native or naturalized U.S. citizens. Selection is competitive on the basis of academic merit and potential for success in graduate or professional study. Inquiries should be directed to the graduate or professional program of choice or to the Office of Graduate Education.

Veterans Educational Assistance

The educational assistance program administered by the federal Department of Veteran Affairs, under which a potentially eligible veteran may be entitled to benefits, is largely dependent upon when the individual served on active duty. DVA administers 11 educational assistance programs and the basic eligibility criteria may vary. Generally, only DVA can determine an applicant's eligibility for educational assistance. For more information, contact the nearest DVA office; in West Virginia, the DVA is located at 640 4th Avenue, Huntington, WV 25701; telephone: 1-800-827-1000.

Loans and Employment

Information and guidance on loans for graduate students are available in the Student Financial Aid Office, Mountainlair. On-campus employment opportunities can be investigated at the Student Financial Aid Office in the Mountainlair and the Human Resources Office in Knapp Hall. A summer and part-time job service is operated by the WVU Career Services Center in the Mountainlair. Its purpose is to place students in part-time or temporary jobs in Morgantown and the surrounding area.

Fellowships within the United States and Abroad

Students are encouraged to submit applications to outside agencies that support graduate-level study and research. Among the opportunities available are programs sponsored by the Fulbright-Hays Training Grants, the National Science Foundation, the Marshall Scholarship Program, the National Institutes of Health, the Oak Ridge Associated Universities, and the Rhodes Scholarships. Students should contact the Office of Sponsored Programs for assistance in applying for these programs. In most cases, this office will refer the student to a faculty advisor who can provide detailed assistance. Several national agencies publish information about fellowships and financial aid opportunities for graduate students. Individuals interested in reviewing this information should consult the personnel at the reference desk of the Charles C. Wise, Jr. Library.

Academic Integrity/Dishonesty

The academic development of students and the overall integrity of the institution are primary responsibilities of WVU. Academic dishonesty is condemned at all levels of life, indicating an inability to meet and face issues and creating an atmosphere of mistrust, disrespect, and insecurity. In addition, it is essential in an academic community that grades

accurately reflect the attainment of the individual student. Faculty, students, and administrators have shared responsibilities in maintaining the academic integrity essential for the University to accomplish its mission.

Students should act to prevent opportunities for academic dishonesty to occur, and in such a manner to discourage any type of academic dishonesty.

Faculty members are expected to remove opportunities for cheating, whether related to test construction, test confidentiality, test administration, or test grading. This same professional care should be exercised with regard to oral and written reports, laboratory assignments, and grade books.

Deans and department chairpersons are expected to acquaint all faculty with expected professional behavior regarding academic integrity, and to continue to remind them of their responsibility. Deans and department chairpersons shall assist faculty members and students in handling first-offense cheating allegations at the lowest possible level in the University, and with discretion to prevent damage to the reputation of any person who has not been found guilty in the prescribed manner.

Each member of the teaching faculty and all other WVU employees, including but not limited to assistants, proctors, office personnel, custodians, and public safety officers, shall promptly report each known case of academic dishonesty to the appropriate supervisor, department chairperson, or dean of the college or school concerned, and to the Office of Judicial Programs, Office of Student Life.

Definition

West Virginia University expects that every member of its academic community shares the historic and traditional commitment to honesty, integrity, and the search for truth. Academic dishonesty is defined to include but is not limited to any of the following:

1. **Plagiarism:** To take and pass off as one's own the ideas, writings, artistic products, etc. of someone else; for example, submitting, without appropriate acknowledgment, a report, notebook, speech, outline, theme, thesis, dissertation, or other written, visual, or oral material that has been knowingly obtained or copied in whole or in part, from the work of others, whether such source is published, including (but not limited to) another individual's academic composition, compilation, or other product, or commercially prepared paper.

2. **Cheating** and dishonest practices in connection with examinations, papers, and projects, including but not limited to: a. Obtaining help from another student during examinations. b. Knowingly giving help to another student during examinations, taking an examination or doing academic work for another student, or providing one's own work for another student to copy and submit as his/her own. c. The unauthorized use of notes, books, or other sources of information during examinations. d. Obtaining without authorization an examination or any part thereof.

3. **Forgery**, misrepresentation or **fraud**:

a. Forging or altering, or causing to be altered, the record of any grade in a grade book or other educational record.

b. Use of University documents or instruments of identification with intent to defraud.

c. Presenting false data or intentionally misrepresenting one's records for admission, registration, or withdrawal from the University or from a University course.

d. Knowingly presenting false data or intentionally misrepresenting one's records for personal gain.

e. Knowingly and unethically furnishing the results of research projects or experiments.

f. Knowingly furnishing false statements in any University academic proceeding.

Academic dishonesty includes plagiarism; cheating and dishonest practices in connection with examinations, papers, and projects; and forgery, misrepresentation, and fraud. Some cases of forgery, misrepresentation, or fraud which occur outside the context of courses or academic requirements may be referred directly to the University Committee on Student Rights and Responsibilities by any member of the University community. In such cases, the University Committee on Student Rights and Responsibilities will arrange a hearing following the procedure outlined in Step 3 within 15 calendar days of receipt of the charges.

Hearing Procedure Steps

Step 1. If a student is charged with academic dishonesty, the instructor will contact the student in person and/or notify the student in writing of the specifics of the charge within 15 calendar days of the discovery of the offense. The student must respond within five calendar days of the receipt of the notification. If the instructor determines the student is guilty, the maximum penalties the instructor may administer are exclusion from the course, a lower grade, and/or an unforgivable F (not eligible for D/F repeat policy) in the course. The instructor and/or the department chairperson also may recommend to the dean of the college in which the course is offered that additional penalties be imposed on the student. At the discretion of the faculty member or department chairperson, in cases where there is written admission of guilt by the student, the case may be satisfactorily resolved at the departmental level. Whenever a penalty is administered, the facts of the case shall be reported in writing to the dean of the college or school and a copy forwarded to the Office of Judicial Programs for the permanent records. In cases wherein academic dishonesty occurs in a college or school other than that in which the student is enrolled, the results of the case shall be reported to the dean of the college or school in which the student involved is enrolled.

Step 2. If the student denies guilt, if the student believes the penalty imposed in Step 1 is unjust, or if the instructor and/or department chairperson determines the penalties available at Step 1 are insufficient for a specific act, the dean of the college or school in which the course is offered shall be notified in writing of the specifics of the case. The dean shall then implement the following steps within 15 calendar days of receipt of notification:

Step 3. If the student wishes to appeal the decision of the dean, the appeal must reach the University Committee on Student Rights and Responsibilities within 30 calendar days of the student's receipt of the dean's decision. The University Committee on Student Rights and Responsibilities will arrange a hearing within 15 calendar days using the following procedures:

The University Committee on Student Rights and Responsibilities will reach a decision within seven days of the hearing. If the University Committee on Student Rights and Responsibilities finds the student guilty, it will determine the penalty it deems appropriate under the circumstances and inform all parties involved. The penalty imposed cannot be more severe than the penalty imposed by the dean.

Step 4. Only sanctions of suspension or dismissal invoked or upheld by the University Committee on Student Rights and Responsibilities may be appealed to the President or his/her designee. Such appeals must reach the President's Office within 30 calendar days after receipt of written notice of the decision of the University Committee on Student Rights and Responsibilities. The decision of the President or the President's designee is final.

Notes on the fee charts on the following pages:

† Nine credit hours are considered the usual maximum at WVU.

* Special fees include Mountainlair (\$56), Daily Athenaeum (\$7), radio station (\$5), health, counseling service, and programs (\$104), transportation (\$50), student affairs (\$30), and athletic (\$44).

Fees listed are accurate as of January 1, 1996; however, fees are subject to change without notice. Contact the Office of Admissions and Records for more current information.

Fees per Credit Hour for Graduate Studies

Credit Hours	Resident			Non-Resident		
	Tuition	Special Fees*	Total	Tuition	Special Fees*	Total
0	\$98	\$33	\$131	\$358	\$33	\$391
1	98	33	131	358	33	391
2	196	66	262	716	66	782
3	294	99	393	1,074	99	1,173
4	392	132	524	1,432	132	1,564
5	490	165	655	1,790	165	1,955
6	588	198	786	2,148	198	2,346
7	686	231	917	2,506	231	2,737
8	784	264	1,048	2,864	264	3,128
†9	872	296	1,168	3,211	296	3,507

Higher Education Resource Fund

This fee is paid by graduate students in the Colleges of Business and Economics and Engineering and Mineral Resources.

Credit hours	Resident	Non-Resident
0	\$18	\$25
1	18	25
2	36	50
3	54	75
4	72	100
5	90	125
6	108	150
7	126	175
8	144	200
†9	155	225

Fees per Credit Hour for Health Sciences Graduate Studies

Credit Hours	Resident				Non-Resident			
	Tuition	Special Fees	Health Prof.	Total	Tuition	Special Fees	Health Prof.	Total
0	\$72	\$33	\$59	\$164	\$219	\$33	\$230	\$482
1	72	33	59	164	219	33	230	482
2	144	66	118	328	438	66	460	964
3	216	99	177	492	647	99	690	1,446
4	288	132	236	656	876	132	920	1,928
5	360	165	295	820	1,095	165	1,150	2,410
6	432	198	354	984	1,314	198	1,380	2,892
7	504	231	413	1,148	1,533	231	1,610	3,374
8	576	264	472	1,312	1,752	264	1,840	3,856
9	635	296	525	1,456	1,955	296	2,063	4,314

Additional Fees for Pharmacy

Hours	Resident	Non-Resident	Resident	Non-Resident
	Education Fee		Health Professions Fee	
0	\$3.00	\$12	\$74	\$265
1	3.00	12	74	265
2	6.00	24	148	530
3	9.00	36	222	795
4	12.00	48	296	1,060
5	15.00	60	370	1,325
6	18.00	72	444	1,590
7	21.00	84	518	1,855
8	24.00	96	592	2,120
9	25.00	100	660	2,383

Other Fees

Application for admission (Dentistry and Medicine)	\$30
Application for admission (Law or Graduate Studies)	35
Diploma replacement	20
Graduation	30
(All students pay this fee at the beginning of the semester or session in which they expect to complete their degrees.)	
Late registration (nonrefundable)	30
(Charged to students who do not register on the registration days set forth in the University Calendar.)	
Non-enrolled graduate student evaluation fee	50
(For graduate students not otherwise enrolled at time of final exam.)	
Professional engineering degree (includes \$20.00 graduation fee)	35
Program reactivation fee (graduate students)	35
Reinstatement of student dropped from the rolls	20
Student identification card replacement	20
Student record fee	5
Official transcript	5
Official letter (statement of degree/grade-point average)	5
Course descriptions	5
Priority service on above	8

Summer Session Tuition and Fees

Tuition, per semester hour	Resident	Nonresident
Graduate Students	\$98	\$358
Dentistry Students	121	310
Medicine Students	93	254
Daily Athenaeum Fee*	3	3
Radio Station Fee*	2	2
Health, Counseling, and Program Services Fee	39	39
Mountainlair Construction Fee, per six week summer session or any portion thereof*	21	21
Student Affairs Fee	11	11
Transportation Fee	19	19

*Fee required of all students. (Nonrefundable unless student withdraws officially before the close of general registration.)

Part 4 Programs and Courses

Schedule of Courses

Before the opening of each semester and the summer sessions, a *Schedule of Courses* is printed, announcing the courses that will be offered by the colleges and schools of WVU.

Plan for Numbering Courses

For convenience, each course of study is designated by the name of the department in which it is given and by the number of that course. The plan for numbering courses is as follows:

Courses 1-99: Courses intended primarily for freshmen and sophomores.

Courses 100-199: Courses intended primarily for juniors and seniors.

Courses 200-299: Courses for advanced undergraduate students and selected graduate students. No more than 40 per cent of the credits counted for meeting requirements for a graduate degree can be at the 200 level.

Courses 300-399: Courses for graduate students, students in professional programs leading to a doctorate, and selected advanced undergraduate students. Undergraduates in any class carrying a 300-level course number must have a 3.0 cumulative grade point average and written approval on special forms from the course instructor and the student's advisor. Seniors within 12 semester hours of graduation may, with prior approval of their advisors, enroll in 300-level graduate courses for graduate credit.

Courses 400-499: Courses for graduate students only.

In summary, 200-level courses are intended primarily to serve undergraduate students; 300-level courses are intended primarily to serve introductory course needs for graduate programs.

NOTE: Graduate degree credit-hour requirements must include at least 60 per cent at the 300 and 400 level.

Graduate Level Common Course Numbers and Descriptions

(as approved by the Faculty Senate)

Course 391 *Advanced Topics*. Variable 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

Course 397 *Research*. Variable 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

Any school, college, department, or division may elect to offer these courses for its students. With the approval of the assistant vice president for curriculum and instruction, these courses may be graded S or U.

Courses 491 and 497: Courses 491 *Advanced Study* and 497 *Research* are approved for University-wide use by any academic unit. Courses numbered 491 and 497 may be graded S or U.

Courses 492-495: Courses are approved by the assistant vice president for curriculum and instruction. Approved requests are forwarded to the Office of Admissions and Records for entry into the WVU *Schedule of Courses*.

490. *Teaching Practicum*. I and II. 1-3 hr. PR: Consent. Supervised practice in college teaching of _____ (Subject matter determined by department/division/college/school offering the course.)

Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. Courses numbered 490 are graded S/U.

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced topics which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

Note: This course is intended to be helpful in pioneering new courses prior to requesting formal approval through the Senate Curriculum Committee and the full Faculty Senate (no later than the semester following the second offering of a particular Special Topics course) and to allow distinguished visitors whose stay will be a month or longer to instruct in their own fields of specialty.

492. *Directed Study*. I, II, S. 1-6 hr. Directed study, reading, and/or research.

493. *Special Topics*. I, II, S. 1-6 hr. A study of contemporary topics selected from recent developments in the field.

494. *Special Seminars*. I, II, S. 1-6 hr. Special seminars arranged for advanced graduate students.

495. *Independent Study*. I, II, S. 1-6 hr. Faculty-supervised study of topics not available through regular course offerings.

496. *Graduate Seminar*. 1 hr. PR: Consent. It is anticipated that each graduate student will present at least one seminar to the assembled faculty and graduate student body of his/her program.

Note: This course is intended to provide a mechanism for graduate students to give their "maiden speech" in their chosen discipline. Grading will be S/U.

497. *Research*. 1-15 hr.

498. *Thesis*. 2-4 hr. PR: Consent.

Note: This is an optional course for programs that believe that this level of control and supervision is needed during the writing of students' reports, theses, or dissertation.

499. *Colloquium*. 1-6 hr. PR: Consent. For graduate students not seeking course work credit but who wish to meet residence requirements, use the University's facilities, and participate in its academic and cultural programs.

Note: Graduate students who are not actively involved in course work or research are entitled, through enrollment in his/her department's 499 Graduate Colloquium, to consult with graduate faculty, participate in both formal and informal academic activities sponsored by his/her program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for masters' programs.

General Comment

Graduate Council policy requires that any student in a master's program has a minimum of 24 hours of "regular" course work: **"...a minimum of 24 hours of course work other than thesis credit is standard and a minimum of 30 total hours is also standard."**

Abbreviations Used in Course Listings

- I: a course given in the first (fall) semester.
- II: a course given in the second (spring) semester.
- I, II: a course given each semester.
- I and II: a course given throughout the year.
- Yr: a course continued through two semesters.
- S: a course given in the summer.
- Hr: credit hours per course.
- Lec: lecture period.
- Rec: recitation period.
- Lab: laboratory period.
- Conc: concurrent registration required.
- PR: prerequisite.
- Coreq: corequisite.
- Consent: consent of instructor required.
- CR: credit but no grade.

An asterisk (*) following credit hours listed as variable indicates that the course normally carries three credit hours. Exceptions are made only in emergencies and must be approved by the departmental chair and by the professor teaching the course.

College of Agriculture and Forestry

Rosemary R. Haggett, Ph.D., Dean; Director of West Virginia Agricultural and Forestry Experiment Station

Kerry S. Odell, Ph.D., Associate Dean for Academic Affairs and Development

Alfred L. Barr, Ph.D., Associate Director, West Virginia Agricultural and Forestry Experiment Station

The College of Agriculture and Forestry is comprised of five divisions: animal and veterinary sciences, family resources, forestry, plant and soil sciences, and resource management. The college's faculty and staff are located in four buildings on the Evansdale campus, in one building on the downtown campus, on farms administered by the College of Agriculture and Forestry in Kearneysville, Morgantown, Reedsville, Union, and Wardsensville, and at the University Forest on nearby Chestnut Ridge. The College also operates the West Virginia University Child Development Laboratory (Nursery School).

Students study many different subjects concerned with human behavior, plants, animals, and microorganisms. Curricula in the college stress biological and chemical sciences, applied ecology, fabricated structures, and relationships among people as they live and work in a wide variety of settings. Courses offered in the College give students a comprehensive understanding of the basic elements that interrelate with and affect our environment.

The College of Agriculture and Forestry sponsors research via an organizational structure called the West Virginia Agricultural and Forestry Experiment Station. The Experiment Station is the mechanism through which most research proposals are generated, evaluated, approved, and funded. The University controls extensive lands, which are administered by the College, with specific areas set aside for research and teaching purposes in dairy, general livestock, poultry, forestry, wildlife management, horticulture, general agronomy, entomology, and soils. The required instruction and analytic work is performed in the classrooms and laboratories of the University's facilities.

College of Agriculture and Forestry Graduate Programs

Agricultural Education	M.S.
Agricultural and Resource Economics	M.S.
Agricultural Sciences	Ph.D.
<i>Animal and Food Science, Plant and Soil Science</i>	
Agriculture	M.Agr.
Animal and Veterinary Sciences	M.S.
<i>Animal Sciences, Breeding, Food Sciences, Nutrition, Physiology, Production</i>	
Family Resources	M.S.
<i>Child Development and Family Studies, Human Nutrition</i>	
Forest Resources Science	Ph.D.
<i>Forest Resources Management, Wildlife and Fisheries Management, Wood Science</i>	
Forestry	M.S.F.
Genetics and Developmental Biology	Ph.D.
Natural Resource Economics	Ph.D.
Plant and Soil Sciences	M.S.
<i>Agronomy, Entomology, Environmental Microbiology, Horticulture, Plant Pathology</i>	
Recreation and Parks Management	M.S.
Reproductive Physiology	Ph.D.
Wildlife and Fisheries Resources	M.S.

The College of Agriculture and Forestry currently offers five doctoral programs:

- **Ph.D. in Agricultural Sciences.** Doctoral students may choose from a major in either animal and food sciences or plant and soil sciences.

- **Ph.D. in Forest Resource Sciences.** Doctoral students may choose from the following majors: forest resource management, wildlife and fisheries management, or wood science.

- **Ph.D. in Natural Resource Economics.** Doctoral students may choose from the following majors: natural resource and environmental economics, commodity market analysis, modeling and forecasting, or international agricultural and rural resource development. The College directs two interdisciplinary doctoral programs.

- **Ph.D. in Genetics and Developmental Biology.** Doctoral students may select from 16 areas of emphasis related to human, plant, and animal genetics, and developmental biology.

- **Ph.D. in Reproductive Physiology.** Doctoral students may select courses in biochemistry, developmental embryology, endocrinology, reproductive physiology, statistics, and physiology.

The College of Agriculture and Forestry offers many programs at the master's level. Students can choose from the following majors for a master's degree: agricultural and resource economics, agricultural education, animal sciences, family resources, forestry, plant sciences, recreation and parks management, or wildlife and fisheries management. In addition, students may choose to pursue a master of agriculture (M. Agr.) or a master of science in the interdisciplinary programs in genetics and developmental biology or reproductive physiology.

For additional information concerning any of the graduate programs in Agriculture and Forestry contact the Associate Dean and Coordinator of Graduate Studies, College of Agriculture and Forestry, P.O. Box 6108, West Virginia University, Morgantown, WV 26506-6108; Telephone (304) 293-2691.

General Admission Requirements and Information

Regular: A regular graduate student is a degree-seeking student who meets all the criteria for regular admission to a program of his/her choice. The student must possess a baccalaureate degree from a college or university, have at least a grade-point average of 2.75 on a 4.0 scale (or an average of 3.0 or higher for the last 60 credit hours), meet all the criteria established by the degree program, and be under no requirements to make up deficiencies.

The student must:

1. Have an adequate academic aptitude at the graduate level as measured by the Graduate Record Examination (GRE), or the New Medical College Admissions Test (New MCAT).

2. Provide three letters of reference from persons acquainted with the applicant's professional work, experience, or academic background.

3. Submit a written statement of 500 words or more indicating the applicant's goals and objectives relative to receiving a graduate degree.

4. International students have the additional requirement to submit a minimum score of 550 on the TOEFL examination if their native language is not English.

See the specific graduate programs for additional requirements.

Provisional: A student may be admitted as provisional when the student possesses a baccalaureate degree but clearly does not meet the criteria for regular admission. The student may have incomplete credentials, deficiencies to make up, or may have a promising undergraduate scholastic record that is less than the 2.75 grade-point average or an average of 3.0 or higher in the last 60 credit hours required for regular admission.

Non-Degree: A non-degree student is a student not admitted to a program. Admission as a non-degree student does not guarantee admission to any course or program. The reasons for non-admission may be late application, incomplete credentials, scholarship deficiencies, or lack of a degree objective. Even though a non-degree student has not been admitted to a graduate program, an academic unit may allow a non-degree student admission. A student must present evidence of a baccalaureate degree and obtain a 2.5 grade-point average on the first 12 credit hours of course work and maintain this average as long as enrolled. A maximum of 12 credit hours of work as a non-degree student may be applied to a graduate degree if the student is later accepted into a graduate program. To be eligible to enter a degree program, the student must maintain a minimum of a 3.0 grade-point average on all course work taken since admission as a graduate student.

Graduate Faculty

* Indicates associate membership in the graduate faculty.

† Indicates regular membership in the graduate faculty.

Animal and Veterinary Sciences

Professors

*William E. Collins, Ph.D. (U. Wisc.). Bovine reproduction.

†Robert A. Dailey, Ph.D. (U. Wisc.). Reproductive physiology.

†William H. Hoover, Ph.D. (Penn. St. U.). Animal nutrition.

†E. Keith Inskeep, Ph.D. (U. Wisc.). Reproductive physiology.

†Paul E. Lewis, Ph.D. (WVU). Reproductive physiology.

†Ronald A. Peterson, Ph.D. (Mich. St. U.). Nutrition. Physiology-poultry.

†Edward C. Prigge, Ph.D. (U. Maine). Animal nutrition.

†John E. Warren, Ph.D. (U. of Md.). Director. Reproductive Physiology

Associate Professors

†Hillar Klandorf, Ph.D. (U. Edinburgh). Poultry physiology.

*Phillip I. Osborne, Ph.D. (Clemson U.). Extension Specialist. Livestock marketing and production.

†Richard Russell, Ph.D. (Iowa St. U.). Animal nutrition.

*Wayne R. Wagner, Ph.D. (Colo. St. U.). Extension Specialist. Animal breeding and genetics.

Assistant Professors

†P. Brett Kenney, Ph.D. (Kansas St. U.). Meat Science.

†John Killifer, Ph.D. (Ore. St. U.). Nutritional Biochemistry.

*Paul M. Smith, M.S. (WVU). Food sciences.

Family Resources

Professors

†Wanda F. Franz, Ph.D. (WVU). Human development, Cognitive development theory.

†Mary K. Head, R.D., Ph.D. (Purdue U.). Experimental foods, Applied human nutrition, Food and dietary evaluation.

*Nora M. MacDonald, M.S. (Iowa St. U.). Apparel design, Clothing for special needs, Fashion merchandising.

†M. Zafar Alam Noman, Ph.D. (Rutgers U.). Dietary fiber, Cholesterol, Protein and energy metabolism, Nutritional assessment, International nutrition.

Associate Professors

*Marian Beth Liddell, Ed.D. (WVU). Curriculum, Instruction, Supervision.

*Charlotte Nath, Ed.D. (WVU). Adjunct.

*Richard Strasberger, Ed.D. (WVU). Adjunct. Special education, Parenting education.

†Bobbie Gibson Warash, Ed.D. (WVU). Preschool curriculum.

Assistant Professors

†Hazel A. Bourne Hiza, Ph.D. (Harvard U.). Applied human nutrition, Pregnancy and nutrition.

*Chet Johnson, M.D. (U. Kansas). Adjunct. Child development.

†Carol Markstrom-Adams, Ph.D. (Utah St. U.). Family, Adolescents, Social contexts.

*Christine A. Myres, M.S. (F.S.U.). Interior design.

Kari Price, M.S. (WVU). Adjunct. Developmental disabilities.

*Dottie D. Rauch, M.Ed. (Penn. St. U.). Family resource management.

*Susan Rodman, Ed.D. (WVU). Adjunct. Statistics.

Lecturer

*Betty Forbes, M.A. (WVU).

Forestry

Professors

†Eugene C. Bammel, Ph.D. (Syracuse U.). Recreation and Parks. Leisure theory, Historical interpretation, Tourism.

†Lei Lane Bammel, Ph.D. (U. Utah). Recreation and Parks. Leisure studies, Research designs.

*Jack E. Coster, Ph.D. (Tex. A&M U.). Forestry, Entomology.

†Ray R. Hicks, Jr., Ph.D. (SUNY). Forest Management. Forest ecology, Forest pest management.

*Joseph M. Hutchinson, Jr., M.S. (WVU). Recreation and Parks. Recreation/parks management, Administration planning, Policy.

†Edwin D. Michael, Ph.D. (Tex. A&M U.). Wildlife Management. Wildlife management, Wetland wildlife.

†David E. Samuel, Ph.D. (WVU). Wildlife Management. Policy and administration, Wildlife attitudes, Hunter education.

†Stanislaw Jan Tajchman, Ph.D. (U. Munich). Forest Management. Forest meteorology.

†Robert C. Whitmore, Ph.D. (B. Young U.). Wildlife Management. Avian ecology, Quantitative ecology.

†Harry V. Wiant, Jr., Ph.D. (Yale U.). Forest Management. Mensuration, Silviculture.

Associate Professors

†James P. Armstrong, Ph.D. (SUNY). Interim director. Wood Science. Physical properties and hardwood drying.

*William N. Grafton, M.S.F. (WVU). Extension specialist, Wildlife.

†Curt C. Hassler, Ph.D. (VPI&SU). Leader, Appalachian Hardwood Center. Wood Science. Harvesting, Quantitative methods.

†Steven J. Hollenhorst, Ph.D. (Ohio St. U.). Recreation and Parks. Wilderness management.

†David E. Patterson, Ph.D. (Tex. A&M U.). Wood Science. Plant layout, Decision-making, Processing.

†Sue A. Perry, Ph.D. (N. Tx. St. U.). Adjunct. Cooperative Fish and Wildlife Unit. Aquatic ecology.

Assistant Professors

Ben E. Dawson-Andoh, Ph.D. (U. British Columbia). Wood science. Wood chemistry and biodeterioration.

†Mary Ann Fajvan, Ph.D. (U. Maine). Forest management, Quantitative silviculture.

†Linda S. Bribko, Ph.D. (WVU). Forest management. Integrated resources management and landscape level planning.

†Andrew F. Egan, Ph.D. (PSU). Wood science. Forest harvesting and roads.

*Rory F. Fraser, Ph.D. (PSU). Forest management. Forest economics and international trade.

†Steven W. Selin, Ph.D. (U. Ore.). Recreation and parks, Parks and tourism management.

†Petra B. Wood, Ph.D. (U. Fla.). Adjunct. Cooperative fish and wildlife unit. Wildlife ecology.

Genetics and Developmental Biology

Professors

David F. Blaydes, Ph.D. (Ind. U.). Plant genetics, Plant physiology, Cytokinins.

Donald F. Butcher, Ph.D. (Iowa St. U.). Population genetics.

Linda Butler, Ph.D. (U. Ga.). Entomology. Forest entomology, Pest management.

Nyles Charon, Ph.D. (U. Minn.). Medical bacteriology, Genetics and physiology of spirochetes.

Walter J. Kaczmarczyk, Ph.D. (Hahnemann Med. Col.). Biochemical genetics, Biochemistry.

Edward C. Keller, Ph.D. (Penn. St. U.). Ecological genetics, Population genetics.

Gregory W. Konat, Ph.D. (U. Odense). Myelinogenesis, Chromatin and gene expression.

Daniel M. Lewis, Ph.D. (WVU). Adjunct. Immunology, Mechanism of immunological reactions in the lung.

Joseph P. Morton, Ph.D. (Mont. St. U.). Ecological, developmental and molecular studies in fungi.
 Joginder Nath, Ph.D. (U. Wisc.). Chairperson. Cytogenetics, Evolution, Mutagenetics.
 Tong-man Ong, Ph.D. (Illinois St. U.). Adjunct. Mutagenesis toxicology.
 Robert S. Pore, Ph.D. (U. Cal.). Mycology, Pathobiology, Mycoses.
 William Sorenson, Ph.D. (U. Tx.). Adjunct. Role of fungi in occupational lung disease.
 William V. Thayne, Ph.D. (U. Illinois). Statistics, Statistical genetics.
 George V. Tryfiates, Ph.D. (Rutgers U.). Nutritional oncology.
 Knox Van Dyke, Ph.D. (St. Louis U.). Chemiluminescence in human cells, Effects of anti-inflationary drugs on chemiluminescence.
 William Wallace, Ph.D. (WVU). Adjunct. Surface spectroscopy and genetic toxicology of respirable mineral and organic particles.

Associate Professors

Keith Garbutt, Ph.D. (U. Wales). Population genetics.
 Ann Hubbs, Ph.D. (Co. St. U.). Adjunct. Veterinary toxicologic pathology, Mechanisms of toxic injury.
 Hillar Klandorf, Ph.D. (U. Edinburgh). Endocrinology.
 Dennis O. Overman, Ph.D. (U. Mich.). Teratology, Organ culture.
 Jeanine Strobl, Ph.D. (Geo. Wash. U.). Estrogen receptor mechanisms.
 David B. Yelton, Ph.D. (U. Mass.). Microbial genetics, Bacteriophage, Molecular genetics.

Assistant Professors

Rajeev Arora, Ph.D. (U. Wisc.). Perturbations related to low temperature stress.
 Brad Hillgartner, Ph.D. (Mich. St. U.). Nutritional control of gene expression, Thyroid hormone action.
 Wei-Shau Hu, Ph.D. (U.C.-Davis). Retrovirus recombination and replication, Mechanisms of oncogene transduction, Human gene therapy.
 Daniel Panacionne, Ph.D. (Purdue U.). Gene cloning, Gene transfer.
 Vinay Pathak, Ph.D. (U.C.-Davis). Retroviral genetics, Isolation of anitoncogenes.
 Mohamdi A. Sarkar, Ph.D. (Virg. Comm. U.). Etiology of uterine and bladder cancers.
 James Sheil, Ph.D. (U. Ky.). Immunology, Mechanisms of cytotoxic T lymphocyte-mediated antigen recognition and effector function.

Plant and Soil Sciences

Professors

*James W. Amrine, Jr., Ph.D. (Iowa St. U.). Entomology. Medical entomology, Apiculture, Biological control.
 *Barton S. Baker, Ph.D. (WVU). Director. Agronomy. Forage crops.
 *John A. Balasko, Ph.D. (U. Wisc.). Agronomy. Forage crops.
 *John F. Baniecki, Ph.D. (U. Ariz.). Extension. Plant Pathology. Plant disease identification and control.
 *Bradford C. Bearce, Ph.D. (U. Calif.). Horticulture. Florist and nursery crops.
 *Alan R. Biggs, Ph.D. (PSU). Plant pathology, Tree fruits.
 *Gary K. Bissonnette, Ph.D. (Mont. St. U.). Environmental microbiology, Aquatic microbiology.
 *William B. Bryan, Ph.D. (Iowa St. U.). Agronomy. Pastures.
 *Linda Butler, Ph.D. (U. Ga.). Entomology. Forest entomology, Pest management, Lepidoptera.
 *Henry W. Hogmire, Ph.D. (Mich. St. U.). Entomology. Tree fruit entomology, Integrated pest management.
 *L. Morris Ingle, Ph.D. (Purdue U.). Horticulture. Post-harvest physiology of tree fruits.
 *Walter J. Kaczmarczyk, Ph.D. (Hahnemann Med. C.). Genetics. Biochemical genetics.
 *William L. MacDonald, Ph.D. (Iowa St. U.). Plant Pathology. Forest and shade tree diseases.
 *Joseph B. Morton, Ph.D. (Mont. St. U.). Plant Pathology. Mycorrhizal interactions, Field crop diseases.
 *Joginder Nath, Ph.D. (U. Wisc.). Genetics. Cytogenetics, Evolution, Mutagenesis.
 *John C. Sencindiver, Ph.D. (WVU). Agronomy. Soil science, Soil genesis and classification, Land reclamation.
 *Rabindar N. Singh, Ph.D. (VPI&SU). Agronomy. Soil chemistry and mineralogy.
 *Richard K. Zimmerman, Ph.D. (WVU). Extension, Plant Sciences. Plant sciences, Conservation.

Associate Professors

- †James L. Brooks, Ph.D. (U. Calif.). Agricultural Biochemistry. Enzymes and plant biochemistry.
- †Alan J. Sexstone, Ph.D. (Mich. St. U.). Environmental Microbiology. Nutrient cycling and biodegradation of pollutants.
- †Jeffrey Skousen, Ph.D. (Tex. A&M U.). Extension specialist. Land reclamation.
- †Joseph E. Weaver, M.S. (WVU). Entomology.

Assistant Professors

- †Daniel Panacionne, Ph.D. (Purdue U.). Gene cloning, Gene transfer.
- Rajeev Arora, Ph.D. (U. Wisc.). Horticulture, Plant physiology, Environmental stress.

Resource Management Professors

- *Alfred L. Barr, Ph.D. (Okla. St. U.). Associate Director, Agricultural and Forestry Experiment Station.
- †Dale K. Colyer, Ph.D. (U. Wisc.). Production economics., Rural development.
- †Robert G. Diener, Ph.D. (Mich. St. U.). Agricultural and environmental technology, Electricity, Agricultural mechanization research.
- †Kendall C. Elliott, M.S.Ag.E. (WVU). Agricultural and environmental technology, Engines, Hydraulics, Agricultural mechanization research.
- †Jerald J. Fletcher, Ph.D. (U. Cal.). Agricultural and resource economics, Resource economics.
- †Stacy A. Gartin, Ph.D. (Ohio St. U.). Agricultural education, Communications, Program planning, Leadership development, Adult education, Teaching methods.
- *Alon Kvashny, Ed. D. (WVU). Landscape architecture. Site design, Landscape construction.
- †Walter C. Labys, Ph.D. (U. Nottingham). Mineral and energy economics. Commodity modeling.
- †Layle D. Lawrence, Ph.D. (LSU). Agricultural Education. Social science, Curriculum development, Teaching methods.
- *George W. Longenecker, M.F.A. (U. Illinois). Landscape Architecture. Plant identification, Planting design.
- *Robert H. Maxwell, Ph.D. (Cornell U.). Agricultural education, International programs.
- †Virgil J. Norton, Ph.D. (Ore. St. U.). Resource management. Agricultural and resource economics.
- †Tim T. Phipps, Ph.D. (U. Cal.). Agricultural and resource economics. Agricultural policy.
- †Peter V. Schaeffer, Ph.D. (U.S.C.). Director, Resource management. Regional science, Applied microeconomics.
- †Dennis K. Smith, Ph.D. (Penn. St. U.). Agricultural and resource economics. Rural development.
- †Thomas Torries, Ph.D. (Penn St. U.). Mineral and energy resource economics.
- *Delmar R. Yoder, Ph.D. (U. Wisc.). Extension. Resource development.

Associate Professors

- *Donald R. Armstrong, M.L.A. (Iowa St. U.). Landscape architecture. Site design, Design implementation.
- †Alan R. Collins, Ph.D. (Ore. St. U.). Agricultural and resource economics.
- †Gerard E. D'Souza, Ph.D. (Miss. St. U.). Agricultural and resource economics. Farm management, Production economics, Finance.
- †Tesfa Gebremedhin, Ph.D. (Okla. St. U.). Agricultural and resource economics. Farm management, Agribusiness.
- *Alexander G. Karther, M.F.A. (U. Okla.). Landscape Architecture. Design communication, Design methodology.
- *Edna McBreen, Ph.D. (Cornell U.). Director, International programs. International agriculture, Agricultural education.
- *Steven B. McBride, M.L.A. (U. Mass.). Landscape construction, Site design, Visual impact analysis.
- †Kerry S. Odell, Ph.D. (Ohio St. U.). Associate Dean. Rural education, Computer application, Leadership development.
- *Charles B. Yuill, M.L.A. (U. Mass.). GIS. Computer applications, Landscape planning.

Assistant Professors

- †Laura Ann Blanciforti, Ph.D. (U. Cal.). Marketing, Econometrics.
- Nancy A. Norton, Ph.D. (WVU). Environmental economics.

Reproductive Physiology

Professors

Robert Cochrane, Ph.D. (U. Wisc.). Adjunct. Reproduction in laboratory and fur animals.

*William E. Collins, Ph.D. (U. Wisc.). Endocrinology of bovine reproduction.

*Robert A. Dailey, Ph.D. (U. Wisc.). Neuroendocrine control of reproduction, Follicular development, Ovulation.

*Mark Gibson, M.D. (Case W. Reserve U.). Ovarian and uterine functions.

*E. Keith Inskeep, Ph.D. (U. Wisc.). Uterine and ovarian prostaglandins in sheep and cattle.

*Paul E. Lewis, Ph.D. (WVU). Puberty, Postpartum and seasonal anestrus as limiting factors in reproduction.

Michael G. Mawhinney, Ph.D. (WVU). Endocrine pharmacology and metabolism of male sex accessory tissues.

*Joginder Nath, Ph.D. (U. Wisc.). Genetics and evolution.

Associate Professor

Robert L. Goodman, Ph.D. (U. Pitt.). Neuroendocrine control of ovarian function.

*Hillar Klandorf, Ph.D. (U. Edinburgh). Poultry physiology.

Assistant Professor

Jorges A. Flores (Geo. Wash. U.). Hypothalamic-pituitary-ovarian interactions.

Agricultural Education

Peter V. Schaeffer, Director, Division of Resource Management

Stacy A. Gartin, Graduate Program Coordinator

2052 Agricultural Sciences Building

Degree Offered: Master of Science

Prerequisites

The agricultural education faculty offers master's programs for persons desiring advanced study in teaching agriculture or in agricultural extension education. Candidates for the master of science degree in agricultural education may be admitted on a regular or provisional basis. A student who does not have a B.S. in agriculture with a major in agricultural education may be required to complete undergraduate courses in agriculture and professional education which are prerequisites to essential graduate courses. Students shall combine graduate courses in agriculture and professional education by taking 16 to 20 hours in agriculture and 10 to 14 hours in education.

Programs are planned to ensure that candidates develop an understanding of:

- The teaching/learning process,
- The design and operation of instructional programs in agriculture,
- Research and evaluation processes,
- The philosophy and purposes of public agricultural education.

All graduate courses offered toward the degree must be approved by the student's advisor. A thesis is required as a part of the 30-hour graduation requirement.

Agricultural Education (AGED)

260. *Prin of Cooperative Extension*. I. 2 hr. PR: Consent. History, Philosophy and mission of the cooperative extension service. Roles and functions of extension faculty in developing and presenting extension programs.

261. *Meth in Extension Education*. II. 2 hr. PR: Consent. Organization and preparation for extension teaching and the processes of communication.

262. *Agricultural and Natural Resource Communications*. 3 hr. Procedures and practices in developing, interpreting, and communicating agricultural and natural resource information; emphasis on visual materials and effective presentations. (3 hr. lec.)

263. *Adult Education in Agr and NR*. 2 hr. PR: Consent. Planning and preparation for teaching adult classes and advising agricultural organizations.

362. *Prog Dev and Eval in Extension*. II. 3 hr. PR: Consent. Planning, implementation and evaluation of programs in rural and community development.

364. *Supervision of Ag Exp Programs*. S. 3 hr. PR: AGED 160 or consent. Planning, supervision and evaluating experience programs of secondary students and adults.

460. *Plan Agr Programs and Courses*. S. 3 hr. PR: AGED 160 or consent. Formulating programs and courses for schools and communities.

492. *Seminar*. I, II, S. 1-3 hr. Overview and analysis of problems, literature, and research in agricultural education.

Resource Management (RESM)

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent.

496. *Graduate Seminar*. I, II, S. 1 hr. PR: Consent.

497. *Research*. I, II, S. 1-15 hr.

Agricultural and Resource Economics

Peter V. Schaeffer, Director, Division of Resource Management

Gerard D' Souza, Graduate Program Coordinator

2018 Agricultural Sciences Building

Degree Offered: Master of Science

The master of science in agricultural and resource economics provides advanced training in the areas of environmental, natural resource, agricultural, mineral, energy, and rural development economics. The degree prepares students for further graduate study and a wide variety of careers in the private sector and government.

Admission Requirements

Prospective graduate students initiate application for admission on forms available from the University Office of Admissions and Records. The completed form should be returned to the Office of Admissions and Records, accompanied by payment of the nonrefundable application fee. An official transcript from all colleges attended during an applicant's undergraduate and graduate studies must be a part of the application for admission.

In addition to general requirements, students must have:

- Three letters of recommendation,
- Twelve or more semester credits in economics, agricultural and resource economics, statistics, or appropriate social science courses (should include intermediate microeconomics),
- Three or more semester hours of credit in calculus,

- A grade-point average of 2.75 for all credit in economics and agricultural and resource economics, and
- A letter of purpose describing research interests and professional aspirations is required.

Students seeking the degree of master of science in agricultural and resource economics may be accepted on a regular or provisional basis. The Admissions Committee reviews and evaluates all applications. Applicants who do not meet all of the requirements above but have special qualifications may be admitted on a provisional basis. Such admission will usually be subject to conditions, however, such as taking course work to make up for deficiencies. Such make-up work will not be counted as part of the credit requirements for the degree. Scores from the Graduate Record Examination are required from all applicants.

A student whose native language is not English must have obtained a minimum score of 550 on the TOEFL examination.

Thesis Option

Either a thesis or a course work option may be selected. Students should select the option by the time 12 hours of course work are completed (usually by the end of the first semester in the program) and after consulting with their graduate committees. Candidates with graduate research assistantships should select the thesis option.

- A minimum of 30 credit hours of approved work to include not more than six hours of credit for the thesis, and enough courses to provide proficiency in economics, resource, and agricultural and resource economics. Courses in closely related areas may be included. The student's graduate committee must approve the student's course of study and thesis topic.

- A minimum of 36 credit hours of approved course work to provide proficiency in economics, resource, and agricultural and resource economics. Courses in closely related areas may be included if approved by the student's graduate committee.

- The student must satisfactorily complete a written and oral examination administered by the graduate committee.

Each candidate's plan of study is developed by the student in consultation with his/her major professor and graduate committee. Normally, the plan of study will include graduate-level courses in economic theory, resource economics, environmental economics, statistics, and agricultural and resource economics. The plan of study should be developed during the first term of study.

A minimum grade-point average of 3.0 is required for all graduate credit courses. This includes graduate credit transferred and graduate credit accumulated while pursuing a degree in agricultural and resource economics. Persons requesting transfers of graduate credit must obtain approval of their graduate committee for such transfers.

Research Assistantships

A limited number of graduate research assistantships is available to highly qualified students on a competitive basis. The awards are based on academic merit only.

Agricultural and Resource Economics (ARE)

201. *Applied Demand Analysis*. II. 3 hr. Consumer demand economics applied to environmental, natural resource, and agricultural issues; analysis of factors that influence demand and determine prices; special applications to non-market, environmental, and natural resource amenities.

202. *Applied Production Economics*. I. 3 hr. Production economics applied to agricultural, environmental, and natural resource issues; production, multiple-product and cost functions, and joint production; effects of environmental and natural resource management regulations on the production process.
206. *Agribusiness Planning*. I. 3 hr. PR: AGE 104 or consent. Application of economic and management principles to agribusiness planning; consideration of risk and uncertainty in agribusiness planning; formulation of economic models for determining optimum allocation of resources for production processes.
210. *Environmental and Resource Economics*. I. 3 hr. PR: ARE 201 and 202; or ECON 211; or consent. Economic analysis of natural resource and environmental problems; management of renewable and nonrenewable resources and environmental amenities; market failure, externalities, benefit-cost and risk analysis; property rights and the "taking" issue.
211. *Rural Economic Development*. I. 3 hr. Economic trends, development policies, and analysis of rural economies in the United States. Rural diversity, development concepts, rural planning, public programs and policies, and community analysis methods.
220. *Agricultural Cooperatives*. I. 3 hr. History, principles, organization, management, taxation, and legal aspects of agricultural, marketing, supply and service cooperatives in the U.S. Development of non-agricultural cooperatives. (Offered in fall of odd years.)
231. *Marketing Agricultural Products*. II. 3 hr. Organization, functions, and analysis of the agricultural marketing system. Food consumption, exports, price analysis, marketing costs, market power, commodities futures market, food safety, and government regulations.
235. *Marketing Livestock Products*. I. 3 hr. Livestock marketing practices and policies. Supply and demand, livestock price cycles, grading, marketing alternatives, processing and retailing. Economic analysis of alternatives, current issues and trends. (Offered in fall of even years.)
240. *Futures Markets and Commodity Prices*. I. 3 hr. Analysis of price-making forces which operate in the market place; emphasis on major agricultural and mineral commodity and futures markets.
245. *Energy Economics*. II. 3 hr. Analysis of the energy sector and its relationship to the rest of the economy; energy security, deregulation, full cost pricing, substitutability among energy sources, transmission, new technologies, environmental considerations.
250. *Agricultural, Environmental and Resource Policy*. II. 3 hr. PR: ARE 201, 202; or ECON 211; or consent. Economic analysis of agricultural, natural resource and environmental policies; problems of externalities and market failure, and alternative policies for addressing such problems; benefits and costs of alternative policies.
261. *Agribusiness Finance*. II. 3 hr. An overview of financial analysis and the application of financial principles to small, rural and agricultural businesses. Includes applications of financial analysis computer software.
300. *Applied Microeconomics*. I. 3 hr. PR: ECON 211 and 220 or equiv. Producer and consumer economics used in resource, environmental, and agricultural economic analysis.

321. *Quantitative Methods in Resource Economics*. I. 3 hr. PR: ECON 220 or equiv. Optimization techniques in economic analysis of natural resources; environmental and agricultural management problems; linear, nonlinear and dynamic programming.

324. *Econometric Methods in Resource Economics*. I. 3 hr. PR: ECON 226. Application methods to natural resource, environmental, and agricultural economic problems; single and simultaneous equation models, specification problems, topics in time series, and cross-sectional analysis.

329. *Resource Commodity Markets*. II. 3 hr. PR: ECON 325 and 326 or consent. Advanced econometric methods of specification, estimation and simulation of domestic and international resource markets and industries; time series and forecasting techniques.

330. *Production Economics*. II., 3 hr. PR: ARE 300 and 321. Developments in producer economics applied to natural resource, environmental, and agricultural issues.

332. *Natural Resource and Environmental Economics*. II. 3 hr. PR: ARE 300 and 321 or equiv. Theory and institutions; market failure, externalities and property rights issues; renewable and nonrenewable resources, common property, environmental and resource management, and intergenerational decisions.

333. *Natural Resource Policy Analysis*. I. 3 hr. PR: ARE 300 and 321 or equiv. Welfare economics applied to the analysis and evaluation of natural resource, environmental, agricultural, and energy policy issues.

340. *Rural and Regional Development*. II. 3 hr. PR: ARE 300 and 321. Economic theories and quantitative techniques. Problems and goals for rural and regional planning; methods of policy analysis for community infrastructure development.

342. *International Agricultural Economic Development*. I. 3 hr. Current problems, theories, policies, and strategies in planning for agricultural and rural development for increased food production and to improve the well-being of rural people in the developing countries of the world.

343. *Project Analysis & Evaluation*. II. 3 hr. PR: Consent. Design, analysis, and evaluation of development projects; economic and financial aspects of project analysis; risk analysis; preparation of feasibility reports.

344. *International Markets and Trade*. I. 3 hr. PR: ARE 300 and 321. Causes and consequences of international trade and investment; commodity market structures, commodity price instability and international agreements; trade barriers and protection, export promotion, and impacts on developing countries.

365. *Mineral Finance*. II. 3 hr. Methods, risks, and problems of financing mineral projects. Large foreign-project financing, concerns of host governments, multinational mining concerns, and financial institutions.

380. *Energy Industry Economics*. II. 3 hr. PR: Graduate standing. Technical production and consumption methodologies, environmental concerns, and national and global economics and politics in making energy decisions.

381. *Resource Appraisal and Decision Making*. II. 3 hr. PR: ARE 300 or equiv. Investment analysis, decision making under risk and uncertainty, and project analysis

applied to resource exploration and utilization; mineral and energy reserve and resource estimation techniques.

382. *Mineral Industry Economics*. II. 3 hr. Supply, demand, structure, technology, costs, prices, and problems of mineral industries.

403. *Advanced Natural Resource Economic Theory*. I. 3 hr. PR: ECON 310 and ARE 332. Allocation and distribution of natural resources in static and dynamic contexts; welfare economics, cost-benefit analysis, and optimal control approaches; applications to resource valuation, exhaustion, taxation, and regulation in theory and practice.

410. *Advanced Environmental Economics*. II. 3 hr. PR: ECON 310 and ARE 332 or consent. Theory, efficient environmental design and analysis, modeling of economic and environmental systems, evaluation of non-market benefits and costs, and risk assessment.

446. *Energy and Regional Development*. II. 3 hr. PR: ECON 355 and ARE 380. Energy in the West Virginia economy and selected regions of the United States.

483. *Minerals Technology Assessment*. II. 3 hr. PR: Consent. Methods of studying the effects of modifications in technology on the production of utilization of minerals, and the effects on mineral demand, supply, substitution and markets.

484. *Oil and Gas Industry Economics*. II. 3 hr. PR: Consent. Geology, engineering, and economic theories of evaluating industry structures and performance.

485. *Economics of the Coal Industry*. Supply, demand, structure, production technology, costs, prices, and problems of the coal industry. Includes environmental, productivity, and transportation issues.

495. *Independent Study*. I, II. 1-4 hr. PR: Consent. Faculty-supervised study of topics not available through regular course offerings.

498. *Thesis/Dissertation Research*. I, II. 1-15 hr. PR: Consent.

Resource Management (RESM)

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent.

496. *Graduate Seminar*. I, II, S. 1 hr. PR: Consent.

497. *Research*. I, II, S. 1-15 hr.

Agricultural Sciences

Rosemary R. Haggett, Dean of the College of Agriculture and Forestry
1170 Agricultural Sciences Building

Degree Offered: Doctor of Philosophy

The College of Agriculture and Forestry offers graduate studies leading to the degree of doctor of philosophy in agricultural sciences. The doctoral program offers two majors: animal and food sciences, and plant and soil sciences. Students entering this program may select research and classes to emphasize environmental microbiology, agronomy, animal nutrition, entomology, horticulture or plant pathology. The objective of

the degree program is to provide doctoral students an opportunity to study and conduct research with faculty in areas of excellence within the College. Research and training in the various disciplines are under ten areas of emphasis in the college: agricultural biochemistry, animal nutrition, animal physiology, production management, crops agronomy, entomology, environmental microbiology, horticulture, plant pathology, and soil sciences.

Admission Requirements

Prospective students initiate application for admission on forms available from the WVU Office of Admissions and Records. The completed forms should be returned to the Office of Admissions and Records, accompanied by payment of the nonrefundable special service fee. An official transcript from all colleges attended in the course of an applicant's masters and undergraduate degrees must be part of the application for admission. Applicants must hold a master's or its equivalent to be eligible for admission into the program.

The following admission and performance standards are normally required in the doctor of philosophy in agriculture sciences program:

- An applicant must possess a master's degree and hold a grade-point average (GPA) of 3.0 or above (on a 4.0 scale) in postgraduate courses.
- The graduate record examination is required. For regular admission a minimum score of 1300 is expected.
- A student whose native language is not English must have obtained a minimum score of 550 on the TOEFL examination.
- An applicant must provide three letters of reference.
- A one to two page letter of intent from the student describing his/her research and professional aspirations is required.

Students who do not meet the requirements, but have special qualifications or circumstances, may be admitted as provisional graduate students if approved by the graduate faculty committee, division director, and doctoral program coordinator.

After a student is admitted into the doctoral program, the appropriate division director will appoint a major professor in the appropriate field of study. Doctoral students will conduct research in support of projects approved by the West Virginia Agriculture and Forestry Experiment Station (WVAFES) or externally funded grants. The major professor, in consultation with the student and the division director, will select a graduate committee within the first semester of study. The committee will consist of five or more members, the majority of whom must be WVU faculty, with at least one member representing a discipline outside the CAF. Each student and his/her committee will formulate a plan of study, which will be filed in the office of the doctoral program coordinator. WVU regulations concerning committee membership will apply, namely, that the chairman and at least two committee members must be regular members of the CAF graduate faculty.

Core Courses

Doctoral students must satisfactorily complete a set of core courses before they will be admitted to candidacy for the Ph.D. degree. All core courses will be at the 300- or 400-level, except where indicated below. Certain course requirements may be waived, if the student has received equivalent training in prior course work. Additional course work pertaining to the student's area of specialization will be determined by the student's major professor and graduate committee. Core courses for students in the doctoral program in Agricultural Sciences will be in the following areas.

- A minimum of six credit-hours of course work must be completed in the biological or earth sciences (excluding courses within a student's major field of study).
- A minimum of six credit-hours must be completed in biochemistry or advanced

chemistry (200-level or above), depending on the student's research concentration.

- A two-semester sequence (minimum of six credits) must be completed in graduate level statistics, plus a course in experimental design OR a two-semester sequence (minimum of six credits) must be completed in graduate-level statistics plus one semester (minimum of three credits) of computer science beyond the introductory level.

- One seminar must be presented during each year or part of year in residence. A final dissertation research seminar will be presented as a college/university wide seminar.

- Oral and written comprehensive (qualifying) examinations will be administered by the student's graduate committee before the end of the second year following admission to the program. Satisfactory completion of the comprehensive examinations and core course requirements will admit the student to candidacy for the Ph.D.

Each candidate for the Ph.D. will be expected to meet the following general requirements:

- A minimum of three semesters in residence,
- Successful completion of course work requirements with a grade-point average of 3.0 or higher,
- Successful completion of comprehensive examinations prepared and evaluated by the student's graduate committee. Oral and written qualifying exams will be taken before the end of the second year following admission to the program,
- A dissertation, with the dissertation research applied toward an approved Experiment Station project or an approved independently funded research project, and
- Successful oral defense of the dissertation.

Although not required, presentation of research results at meetings of a professional society and submission of manuscripts for publication are encouraged.

Agriculture

Rosemary R. Haggett, Ph.D., Dean of the College of Agriculture and Forestry
1170 Agricultural Sciences Building

Degree Offered: Master of Agriculture

Admission Requirements

Students desiring this degree must obtain approval from the Master of Agriculture Committee and meet the minimum admission requirements. The committee charged with administering the degree program is appointed by the Dean of the College of Agriculture and Forestry. The student's baccalaureate degree should be in a field sufficiently related to the desired course of study. A student whose baccalaureate degree is in a field considered not sufficiently related to the study contemplated may be admitted as a provisional student until specific requirements are met or the student may be admitted on the basis of evidence of satisfactory professional experience.

Course Requirements

Satisfactory completion of 36 hours of course work is required for this degree. The student will select a minimum of 9 hours from the course offerings in each of the three agricultural divisions in the College of Agriculture and Forestry (Divisions of Animal and Veterinary Sciences, Plant and Soil Sciences, and Resource Management). No more than three hours of special topics or advanced study from each division may be counted towards the degree. A three-hour problem report may be included at the option of the student and the program committee.

The student may choose the additional courses from within the College of Agriculture and Forestry or from offerings of other colleges and schools of WVU. An overall grade-point

average of 3.0 is required for graduate courses included as part of the approved program for the degree. Upon completion of the course work, each candidate must undergo written and oral examination by the candidate's graduate committee. The graduate committee of each candidate shall have one member of the Master of Agriculture Committee as a member. This member shall not be the chairperson or faculty advisor.

Agriculture (AGRL)

200. *Agricultural Travel Course*. S. 1-6 hr. Tour and study of production methods in major livestock and crop regions of the United States and other countries. Influence of population, climate, soil, topography, markets, labor, and other factors on agricultural production.

360. *Problem Report for the Degree of Master of Agriculture*. I, II, S. 1-3 hr.

Animal and Veterinary Sciences

John E. Warren, Director, Division of Animal and Veterinary Sciences and Graduate Program Coordinator

G038 Agricultural Sciences Building

Degree Offered: Master of Science

The master of science in animal and veterinary sciences in the College of Agriculture and Forestry allows maximum flexibility in courses and research problems. Students may emphasize physiology, production, nutrition or food sciences. They may work with beef and dairy cattle, sheep, swine, poultry, or laboratory animals. Research problems in farm animals form the basis for many studies, but a comparative approach is emphasized.

Prerequisites

Additional requirements are similar to those in other biological sciences. The student should have completed basic courses in the physical and biological sciences, including genetics, nutrition, and physiology. Deficiencies may prolong the time needed to complete degree programs.

A composite graduate record examination score of 1,000 or better will be considered as a basis of admission. The fact that an applicant meets the above requirements shall not guarantee admission since each professor will accept only the number of students that can be supervised adequately with available facilities, time, and funds. Students interested in the Ph.D. should apply for admission to the doctoral program in agricultural sciences.

Agricultural Biochemistry (AGBI)

210. *Introductory Biochemistry*. I, II, S. 3 hr. PR: 8 hr. General chemistry, CHEM 131 or equiv. Introduction to chemistry of cellular constituents (proteins, amino acids, carbohydrates, lipids, nucleic acids, enzymes and coenzymes) and their metabolism in animals and plants.

211. *Introductory Biochemistry Laboratory*. I. 1 hr. Conc.: AGBI 210. Experiments to demonstrate certain principles and properties of animal and plant biochemicals.

212. *Nutritional Biochemistry*. II. 3 hr. PR: AGBI 210 or consent. Nutritional biochemistry of domestic animals.

213. *Nutritional Biochemistry Laboratory*. II. 1 hr. PR: AGBI 210, 211; Conc.: AGBI 212. Experiments to determine the nutritional constituents in animal and plant tissues.

310. *General Biochemistry*. I. 4 hr. PR: 8 hr. organic chemistry. The first half of a general course of biochemistry designed for graduate students of biological sciences. The course emphasizes the chemical properties of cellular constituents.

311. *Laboratory Experiments in Biochemistry*. I. 2 hr. PR or Conc.: AGBI 310. Experiments designed to demonstrate some of the basic tools and procedures of biochemical research.

312. *General Biochemistry*. II. 4 hr. PR: AGBI 310 or consent. The second half of a general course of biochemistry designed for graduate students of biological sciences. The course emphasizes reactions and control of intermediary metabolism.

414. *Enzymes*. II. 3 hr. PR: AGBI 312 or consent. A survey of enzymology covering general principles as well as current concepts and methods.

415. *Advanced Biochemistry Laboratory*. II. 2 hr. PR or Conc.: AGBI 312. Experiments in the areas of intermediary metabolism and enzymology.

416. *Vitamin and Coenzyme Biochemistry*. II. 2 hr. PR: AGBI 312, or BIOL 231, or consent. Chemical and physical properties, analysis, biosynthesis, metabolism, pathobiology, pharmacology, and toxicology of vitamins, vitamin-like compounds, and coenzymes. (Offered in spring of odd years.)

422. *Plant Biochemistry*. I. 3 hr. PR: AGBI 312 or consent. Advanced treatment of the composition and metabolism of plants. Topics include cell wall structure, sulfur and nitrogen metabolism, and photosynthesis. (Offered in fall of odd years.)

424. *Advanced Nutritional Biochemistry*. I. 4 hr. PR: AGBI 310, 311, 312 or consent. Advanced treatment of the biochemistry and metabolism of amino acids, carbohydrates and lipids in the diets of ruminants and nonruminants. (Offered in fall of even years.)

428. *Biomembranes and Muscle Biochemistry*. II. 3 hr. PR: AGBI 312, or BIOC 231, or consent. Chemical, organization, and physiological aspects of membranes and muscles;; molecular and cellular interactions and integrative mechanisms. 3 hr. lec. (Offered in spring of even years.)

Animal and Veterinary Science (A&VS)

420. *Special Topics*. I, II, S. 1-4 hr. (1 hr. credit in special cases only.) Advanced study in particular phases of such animal science topics as animal production, nutrition, physiology, breeding and genetics, veterinary science, and food. (For the master's degree, special topics ordinarily may count 2 to 4 hr.; max. credit, 6 hr.)

491. *Advanced Study*. I, II, S. 1-4 hr.

497. *Research*. I, II, S. 1-15 hr. Research in animal nutrition, physiology, breeding and production, and veterinary science.

Animal Nutrition (ANNU)

301. *Principles of Nutrition and Metabolism*. I. 3 hr. PR: AGBI 210 or consent. A basic course in principles of nutrition with emphasis on the major classes of dietary nutrients and their digestion and utilization.

302. *Nutrition and Physiological Function*. II. 3 hr. PR: ANNU 301 or consent. Sequence to ANNU 301. Techniques used in nutritional studies and the relationship of nutrient requirements to physiological function in species of laboratory and domestic animals and man.

430. *Rumen Metabolism and Physiology*. I. 3 hr. PR: Course in biochemistry. The anatomy and physiology of the forestomachs of ruminants and the rumen microbial population. Emphasis on the microbial metabolism as it pertains to the utilization of feeds by ruminants. (Offered in fall of odd years.)

432. *Forage Chemistry and Quality*. 3 hr. PR: ANNU 301 and AGRN 254, or consent. Advanced course in chemistry and biochemistry of pastures and forages, emphasizing factors affecting their quality and principles governing their utilization by herbivorous animals. (Also listed as AGRN 432.) (Offered in spring of even years.)

434. *Mineral Nutrition of Animals*. II. 3 hr. PR: ANNU 301 or consent. Mineral nutrition of livestock and man; soil-plant-animal interactions. Detailed treatment of function of individual elements and their involvement in deficiency and toxicity conditions on an international basis. (Offered in spring of odd years.)

450. *Seminar*. I, II. 1 hr.

491. *Advanced Study*. I, II, S. 1-6 hr. (Repeat registration permitted for maximum of six credit hours per year.) Topics in advanced nutrition. Subject will be selected by staff for formal presentation.

Animal Physiology and Breeding (ANPH)

200. *Animal Growth and Lactation Physiology*. 3 hr. PR: ANPH 100, or consent. Animal life cycles; nature of growth and lactation; effects of biological, environmental, and social-psychological variants; physiological regulation and control.

204. *Animal Physiology Laboratory*. I. 2 hr. PR: ANPH 100 or consent. Laboratory study of the physiological systems of animals and the influences of environment on these systems.

225. *Physiology of Reproduction*. II. 3 hr. PR: Course in biology. Comparative physiology of reproduction in higher animals; endocrine functions involved in reproduction; genetic and environmental variations in fertility mechanisms.

226. *Breeding of Farm Animals*. I. 3 hr. PR: Course in genetics or consent. Application of principles of quantitative genetics to the improvement of farm animals.

280. *Behavioral Patterns of Domestic Animals*. II. 3 hr. Examination of the bases for exhibition and control of behavioral patterns of domestic animals. 1 lab.

425. *Endocrinology of Reproduction*. II. 4 hr. (2 labs.). PR: ANPH 225 or BIOL 268 or equiv. Discussion of and laboratory experience in classical and current concepts of

hormonal and neurohormonal regulations of reproductive phenomena with emphasis on species differences and similarities. (Offered in spring of odd years.)

426. *Advanced Animal Selection*. II. 3 hr. PR: Course in statistics and course in genetics or equiv. An advanced course dealing with the basic concepts of experimental and statistical approaches in the analysis of quantitative inheritance with special reference to the magnitude and nature of genotypic and nongenotypic variability. (Offered in spring of even years.)

450. *Seminar*. I, II. 1 hr.

Animal Production (ANPR)

250. *Current Literature in Animal Science*. I. 3 hr. PR: ANNU 101. Evaluation of current research in animal science and its application to production and management.

422. *Advanced Milk Production*. II. 3 hr. PR: ANNU 101 or consent. Advanced study of the feeding, breeding, and management of dairy cattle.

Food Science (FDSC)

267. *Advanced Meat Science*. I, S. 3 hr. PR: FDSC 167. Theoretical and experimental aspects of meat science, meat product/process systems, and the quantitative biology of muscle systems used for food.

Veterinary Science (VETS)

205. *Parasitology*. II. 3 hr. PR: Course in biology or consent. Common parasites of farm animals, their life cycles, effects on the host, diagnosis, control, and public health importance. 3 hr. lec., 1 hr. lab.

210. *Principles of Laboratory Animal Science*. I. 3 hr. PR: Consent for undergraduates. The management, genetics, physiology, nutrition, disease, and germ-free quartering of common laboratory animals. 1 lab.

Family Resources

Janice I. Yeager, Interim Director, Division of Family Resources

Wanda Franz, Graduate Program Coordinator

702 Allen Hall

Degree Offered: Master of Science

The graduate program in the Division of Family Resources provides students the opportunity to study for a master of science degree. Two areas of emphasis are offered: (1) child development/family studies; (2) human nutrition.

Students should have completed an undergraduate curriculum in the area of specialization for which they seek admission. A student whose undergraduate degree is in a different field will ordinarily be required to take supplemental undergraduate courses.

The child development/family studies emphasis is structured to give students a basis from which to conduct research and to work with families and children in educational and clinical settings. In addition, the program prepares students for entering Ph.D. programs in child development and family studies, family life education, psychology, or counseling.

Courses in child development and parenting strategies are supplemented with field experience in a variety of settings, such as the West Virginia University Child Development Laboratory, the Ruby Memorial Hospital neonatal intensive care and pediatric units,

the W.G. Klingberg Center for Child Development, Stepping Stones, and parenting education programs in the community.

Individuals choosing an emphasis in child development and family studies may select from a wide variety of careers which include employment as child care specialists, early childhood teachers, developmental specialists, child life educators, parent educators, and extension specialists.

Human Nutrition

The human nutrition program offers students a variety of opportunities in clinical and applied nutrition. Students can apply to be enrolled concurrently in the developmentally accredited dietetic internship program, to become eligible to take the registration examination for the dietetics profession. In addition, the program prepares students for entering doctoral programs in nutrition, education, and nutritional biochemistry.

A variety of research opportunities with the human nutrition and foods faculty is offered to students as collaborative opportunities are available with the WVU Health Sciences Center, the Gerontology Center, the exercise physiology program, and with the West Virginia child nutrition programs.

Background courses in nutrition, foods, general and organic chemistry, and the biological sciences are helpful to students selecting the human nutrition area for specialization. Graduates may select from a wide variety of careers, which include employment in hospitals, clinics, industrial and institutional food service organizations, fitness centers, and government-supported health programs.

Thesis or Research Report

Students pursuing a master of science degree in family resources have a choice of two options: thesis or research report. The thesis option requires a minimum of 39 hours of course work, which includes six hours of thesis credit. The creative/scholarly problem option requires a minimum of 39 hours of course work, which includes three hours credit for research. For further information, contact the Graduate Program Coordinator, Division of Family Resources, 702 Allen Hall, P.O. Box 6124, West Virginia University, Morgantown, WV 26506-6124; (304) 293-3402.

Child Development and Family Studies (CDFS)

212. *Adolescent Development*. II. 3 hr. PR: CDFS 10. Adolescent in contemporary American culture, including normative physical, social, and personality development; relationships within various typical social settings, e.g., family, school, community, peer group.

213. *Contemporary Issues in Family Relations*. II. 3 hr. PR: Senior or graduate standing or consent. Study of recent research findings in the major areas of family relationships. Topics include effects of family violence, substance abuse, poverty, and health.

215. *Family Interaction and Communication*. II. 3 hr. PR: Senior or graduate standing or consent. The family as a social group; processes related to well-being for a variety of family relationships.

216. *Child Development Practicum*. I, II. 3-4 hr. Application of child development principles. Involves planning developmentally appropriate activities for 3, 4, and 5 year-old children at the West Virginia University Child Development Laboratory.

340. *Survey of Family Studies*. I. 3 hr. A comprehensive overview of the theoretical and empirical literature focusing on the family. (Offered in fall of odd years.)

347. *Comparative Study of the Family*. I. 3 hr. The comparative method as a framework for family analysis. An examination of family diversity and multiculturalism in an ever-changing U.S. society. (Offered in fall of even years.)

348. *Theories of Child Development*. II. 3 hr. Examination of major theoretical conceptions of child development. Work of Werner, Piaget, Freud, Erikson, and the American learning theorists compared and contrasted. (Offered in fall of even years.)

Family Resources (FAMR)

391. *Advanced Topics*. I, II. S. 1-6 hr. PR: Consent.

396. *Graduate Seminar*. I, II, S. 1-4 hr. PR: Consent of graduate advisor.

Home Economics Education (HEED)

278. *Vocational Home Economics*. II. 3 hr. PR: Senior standing or consent. Develops an understanding of federal vocational legislation to enable an individual to develop and implement programs in vocational education.

281. *Contemporary Issues in Consumer Science* II. 3 hr. Applies the broad-based philosophy of family and consumer sciences to individual, family, and community problems worldwide.

Home Management and Family Economics (HMFE)

261. *Consumer Economics*. II. 3 hr. Develops an understanding of the consumer's role in our economy by examining the nature and function of the marketplace; the existence and impact of governmental consumer regulation and laws and; consumer interests, buying behaviors, rights, responsibilities, and remedies.

Human Nutrition and Foods (HN&F)

260. *Advanced Nutrition*. I. 3 hr. PR: HN&F 71, physiology. Coreq.: Biochemistry. Role of nutrients in physiological and biochemical processes and metabolism in the body. Biochemical foundations of RDA and clinical nutrition.

261. *Nutrition Laboratory Experimentation*. I. 2 hr. Coreq.: HN&F 260 or consent. Nutrient analysis and introduction to nutrition experimentation; nutritional assessment.

272. *Community Nutrition*. I. 3 hr. PR: HN&F 71. Beginning planning for community nutrition for individuals and families at various stages of the life cycle. Roles of concerned agencies and professional groups. Clinical experience in community facilities.

274. *Nutrition in Disease*. II. 4 hr. PR: HN&F 71; physiology or consent. Nutritional care aspects of patients. Modification of diet to meet human nutrition needs in various medical conditions.

Interior Design (ID)

235. *Contract Interior Design I*. 3 hr. PR: ID 138, 139. Studio experience in contract interior design problems; emphasis on design of offices as work environments.

236. *Interior Design Professional Practices*. I. 3 hr. PR: ID 138. Relationships between marketing/management functions and the design process; problem-solving approach to completion of a design installation.

237. *Contract Interior Design 2*. II. 3 hr. PR: ID 235. Studio experience in solving design problems related to public spaces, hotels, restaurants, department stores, specialized retail outlets, or health care facilities.

239. *Interior Design Internship*. II. 3-6 hr. PR: ID 138 and written consent. Supervised, direct experience with a practicing designer or other closely allied professional in a career environment.

240. *Interior Design Seminar*. II. 1 hr. PR: ID 236. Professionals in interior design discuss professional organizations, ethics, entry-level positions, and business practices.

Textiles and Clothing (TXCL)

224. *Flat Pattern Design*. II. 3 hr. PR: TXCL 27, 124, 126 or consent. Opportunity for creative expression and for understanding of pattern design through the flat pattern. Apparel designed and constructed by the student.

226. *Apparel Design and Illustration*. II. 3 hr. PR: TXCL 224 or consent. Techniques of drawing using a life fashion model and various media for apparel design presentation. Sources of design inspiration examined for developing original apparel designs. Art principles and fashion terminology explored.

227. *Advanced Textiles*. 3 hr. PR: TXCL 27. Comparative characteristics of textile fibers. Physical and chemical properties are studied with reference to fiber morphology and/or manufacturing processes. Issues of textiles and apparel in the global economy are examined. (Offered in fall of even years.)

228. *Functional Apparel*. I. 3 hr. PR: ENGL 1 and 2, TXCL 224 or consent. Physical, psychological, and sociological clothing needs of individuals with functional limitations. Historical developments, current research, and research needs. Each student conducts a community-based project.

229. *Fashion Merchandising Study Tour*. II. 1 hr. PR: Junior or senior standing in textiles and clothing. Study of the textiles and clothing industry through on-site visits to historic costume collections, apparel manufacturing firms, design showrooms, buying offices, pattern companies, and retail establishments. Readings included.

Forestry

James P. Armstrong, Interim Director, Division of Forestry
322-A Percival Hall

**Degrees Offered: Doctor of Philosophy in Forest Resource Science,
Master of Science in: Recreation and Parks Management, Wildlife and Fisheries
Management, Forestry.**

A student seeking admission to work toward the degree of doctor of philosophy in forest resources science in the College of Agriculture and Forestry may choose as the major field of study forest science, wood science, or wildlife and fisheries management. Within these major fields of study, specialization is limited only by the range of competencies in the graduate faculty.

Curriculum Requirements

Curriculum requirements for all candidates include a block of graduate courses in the major field, which will constitute a comprehensive review of the significant knowledge in that field, and a block of graduate courses in a minor field of study. A minimum of 60 semester hours beyond the bachelor's degree and exclusive of the dissertation is required.

Dissertation and Final Examination

The research work for the doctoral dissertation must show a high degree of scholarship and must present an original contribution to the field of forest resources science. In addition to course work and the dissertation, the candidate is required to pass a qualifying examination and a final examination.

Admission Requirements—Master's Degree Programs

Admission requirements are those of the College of Agriculture and Forestry. Additionally, students seeking admission for the degree of master of science in forestry (M.S.F.) should have completed an undergraduate curriculum in forestry. A student whose undergraduate degree is in a field other than forestry will ordinarily be required to take supplemental undergraduate courses. Candidates for the degree may major in forest biometry, forest ecology, forest economics, forest genetics, forest management, forest meteorology, silviculture, or wood industry. The candidate must complete 30 hours of approved study, six hours of which shall constitute a thesis. The program ordinarily requires two years of residence.

The Division of Forestry of the College of Agriculture and Forestry offers program options leading to the master of science for students who wish to major in recreation and parks management. Students selecting this graduate program may emphasize recreation administration and policy, environmental education and interpretation, and recreation planning and resource management. Degree requirements are either 30 semester hours of approved study, including a six credit-hour thesis, or 36 semester hours without a thesis but including a three credit-hour problem paper. This program ordinarily requires two years of residence.

Graduate studies in wildlife and fisheries management in the Division of Forestry lead to the master of science (M.S.) degree. Students may elect either 30 semester hours of approved study, including a six hour thesis or 36 hours of approved study without a thesis but including a three hour problem paper.

Forestry (FOR)

220. *Forest Policy and Administration*. I and II. 3 hr. PR: Upperclass forestry major or consent. Forest policy in the United States; important federal and state laws; administration of public and private forests; problems in multiple-use forestry.

226. *Remote Sensing of Environment*. II. 2 hr. PR: MATH 3, 4. Measurement and interpretation of natural resources and environment from photography, radar, infrared, and microwave imagery.

233. *Principles of Industrial Forestry*. I. 3 hr. PR: Forestry senior or consent. Analysis and case studies of problems pertinent to the integration of wood conversion technology with principles of production, marketing, and management.

310. *Biometeorology*. II. 4 hr. PR: Consent. A description of the physical environment of plants and its effect on growth, its modification for increasing yield and for plant protection against extreme atmospheric conditions.

470. *Special Topics in Forestry, Wood Science, Wildlife, or Recreation*. I, II, S. 1-6 hr.

480. *Principles of Research*. I. 2 hr. The specific method as applied in the formal, concrete, and normative sciences; special emphasis on forestry-related research plans and reports.

490. *Teaching Practicum*. I, II. 1-6 hr. PR: Consent. Supervised practices in college teaching of forest resources management, wood science, wildlife management resources, and recreation and parks.

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled classes.

497. *Research*. I, II, S. 1-15 hr.

498. *Thesis*. I, II, S. 1-6 hr. PR: Consent.

499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking course work credit but who wish to meet resident requirements, use the University's facilities, and participate in its academic and cultural programs.

Forest Hydrology (FHYD)

244. *Watershed Management*. II. 3 hr. PR: FMAN 12, 211. (Primarily for forest management majors.) Influences of silvicultural practices and forest management activities on the hydrology of forested catchments.

Forest Management (FMAN)

200. *Forest Measurement, Interpretation, Wildlife Management*. S. 5 hr. PR: FOR 5; C E 5; FMAN 122. (Course will be taught during four consecutive 6-day weeks.) Application and study of forest resources practice with emphasis on field problems.

201. *Forest Resources Management Southern Trip*. S. 1 hr. PR: FMAN 200 or consent. One-week trip to the Southern Pine Region to observe forest management practices on private and public lands.

211. *Silvicultural Systems*. I. 4 hr. PR: Forestry major or consent; FMAN 12. Principles of regeneration cuttings, intermediate cuttings, and cultural operations, with their application to forest stands.

213. *Regional Silviculture*. I. 2 hr. PR: Forestry major or consent. FMAN 12; PR or Conc.: FMAN 211. Major forest types of the United States: their composition, management, problems, and silvicultural treatment.

216. *Forest Genetics and Tree Improvement*. II. 3 hr. PR: Forestry major or consent; GEN 272 or equiv., or consent. Forest genetic principles and their application to forest tree improvement, including crossing methods, selection systems, and other techniques.

222. *Advanced Forest Mensuration*. II. 3 hr. PR: Forestry major or consent; FMAN 122. Measurement of growth and yield; statistical methods applied to forest measurement problems.

230. *Principles of Forestry Economics*. II. 4 hr. PR: ECON 54 and 55 or equiv. Production, distribution, and use of forest goods and services. Emphasis on analytical methods and problem solving techniques in the economic aspects of forestry.

233. *Forest Management*. I. 3 hr. PR: FMAN 200, 211, and 230. Principles of sustained yield forest management: organization of forest areas, selection of management objectives, application of silvicultural systems, and regulation of cut. Principles of sustainable forestry and ecosystem management.

234. *Forest Resources Management Planning*. I, II. 3 hr. PR: Forestry major or consent; senior standing. Analysis and planning for management of forest resources. Development of a management plan for an actual forest tract.

330. *Advanced Principles of Forestry Economics*. II. 3 hr. PR: ECON 51, 52 or equiv.; FMAN 230 or equiv. Intensive study of both micro- and macroeconomics of forestry.

411. *Advanced Forest Ecology*. I. 3 hr. PR: F. Man. 12 or equiv.; FMAN 211. Ecological relationships in forests with emphasis on biogeochemical cycles.

412. *Silvicultural Practices for Hardwood Forest Types*. II. 3 hr. PR: FMAN 211. Designing proper silvicultural systems for managing Appalachian hardwood stands; reconstructing stand histories, recognizing problems, and prescribing appropriate silvicultural treatment.

Recreation and Parks (RCPK)

216. *Philosophy of Recreation*. II. 3 hr. PR: Consent. Interpretation of recreation as a basic part of the living process; importance to individual community and national welfare; social and economic significance.

226. *Leisure and Aging*. 3 hr. PR: Consent. Analysis and examination of leisure in middle and later stages of the lifecycle; discussion of appropriate facilities and programming for older people.

233. *Wildland Recreation Management*. I. 3 hr. PR: FMAN 12 or consent. Topics include an analysis of administrative agencies concerned with wildland management; methods of ameliorating human impact on outdoor recreation resources; discussion of philosophies underlying wilderness recreation; and a review of contemporary controversies concerning wildlands.

234. *Wilderness in American Society*. II. 3 hr. PR: RCPK 233 or consent. A seminar examining political, sociological, and environmental aspects of American wilderness. A discussion on articles concerning wilderness preservation, management, and aesthetics.

235. *Parks and Recreation Administration*. I. 3 hr. PR: 12 hr. recreation and parks courses, junior standing, or consent. Principles of administration as applied to the operation of recreation and park agencies, including legal foundations, policy, organization, personnel, finance, and programs of service.

239. *Natural Resource Tourism*. I. 3 hr. PR: Junior standing. Tourism in natural settings; emphasis on sustainable tourism development and natural resource stewardship. (Field trip required; some transportation costs.)

242. *Historical and Cultural Interpretation*. II. 3 hr. PR: Recreation and parks major or consent. Methods of locating source materials for reconstructing the historical, cultural, and physical aspects of an area for an interpretive center; preparing brochures, displays, and nature trails to facilitate interpretive activities.

248. *Environmental Concerns in Outdoor Recreation*. I. 3 hr. PR: Consent. Understanding and interpreting environmental concerns within the context of outdoor recreation.

275. *Outdoor Enterprise Operations and Finance*. II. 3 hr. PR: Recreation major or junior standing. Principles and practices in planning, development, operation, and financial management of selected outdoor enterprises; considerable emphasis on assignments involving problem solving.

280. *Therapeutic Recreation Principles and Procedures*. 3 hr. PR: RCPK 241 or consent. Basic intervention techniques in providing therapeutic recreation services, including individual and small group techniques, adaptive equipment, assistive techniques, standards, regulations, and ethics.

282. *Therapeutic Recreation Program Planning*. 3 hr. PR: RCPK 241 or consent. Design and development of therapeutic recreation programs utilizing a systems approach based on leisure related needs of clients. Includes assessment, program development, implementation, monitoring, and evaluation.

408. *Recreation and Park Management Practicum*. 2-4 hr. PR: Consent. Field experience and conference in the study, analysis, and solution of management problems in private, commercial and governmental recreation and park organizations.

415. *Leisure and Recreation*. I. 3 hr. PR: Consent. Study of leisure as a social phenomenon and its implications for recreation.

421. *Recreation Planning: Human Interest Areas*. 3 hr. Exploration of human interest areas as sources of recreation program content; the nature, factors, and extent of participation; and their structuring and administration through work program planning. (Offered in fall of even years.)

462. *Community Recreation*. I. 3 hr. PR: RCPK 316 or consent. Study of problems related to providing adequate recreation services for a community. Standards and quality of recreation service; methods of measuring existing services and their coordination; community organization procedures. For leaders in voluntary agencies, schools, churches, and municipal recreation organizations. (Offered in fall of odd years.)

472. *Seminar in Recreation*. I, II. 1-3 hr. (Repeatable up to 6 hr. credit.) Overview and critical analysis of literature in recreation interpretation, environmental concerns, or leisure studies.

Wildlife and Fisheries Management (WMAN)

213. *Wildlife Ecosystem Ecology*. I. 3 hr. PR: BIOL 15, 17 and FOR 5 or consent. Basic principles of ecosystem ecology, emphasizing structure and function, succession, adaptation of organisms to the environment (physiological ecology), and survey of major ecosystems with emphasis on their role as wildlife habitats.

214. *Wildlife Population Ecology*. II. 3 hr. PR: WMAN 213 or consent. Emphasis on theoretical and applied population ecology including population growth, interactions, regulation, and effects of harvesting and exploitation on natural populations. 2 hr. lec., 1 hr. lab.

224. *Vertebrate Natural History*. I. 3 hr. PR: BIOL 17 or consent. Relationships of fish, amphibians, and reptiles to the forest, with emphasis on the ecology, taxonomy, evolution, natural history, and field identification of these groups. Laboratory emphasizes natural history and anatomy of fish, amphibians, and reptiles.

225. *Mammalogy*. 3 hr. PR: BIOL 17 or consent. Mammals and their biological properties with emphasis on life history, ecology, and distribution of regional forms. (Also listed as BIOL 258.)

226. *Ornithology*. II. 3 hr. PR: BIOL 15 and 17, or consent. Identification, distribution, and ecology of birds (particularly of forest lands). (2 hr. lec., 1 hr. lab.)

228. *Wildlife Policy and Administration*. II. 3 hr. Study of the organization, authority, policies, programs, and administration of public agencies and private organizations concerned with fish and wildlife. Emphasis is on the legal and political role in making wildlife management decisions.

231. *Wildlife Techniques*. I. 3 hr. PR: Wildlife major or consent; WMAN 213, FOR 5. Field and laboratory techniques necessary in management and study of wildlife; collection of field data, mapping, censusing, habitat evaluation, literature and scientific writing.

234. *Principles of Wildlife Management*. II. 3 hr. PR: Wildlife major or consent; W. Man. 213, 231. Major game animals and problems and principles involved in their management.

312. *Advanced Wildlife Population Ecology*. II. 3 hr. PR: WMAN 214 or equiv., or consent. Case history approach to wildlife population ecology with emphasis on ungulates, gallinaceous birds, large predators; forest invertebrates and their vertebrate predators; endangered species; genetics and conservation of wildlife populations. Emphasis on current and historical literature. (3 hr. lec.)

333. *Quantitative Ecology*. I. 3 hr. PR: STAT 311 or equiv., and WMAN 213 or equiv. A survey of techniques and strategies for the quantitative analysis of complex ecological data sets. (Offered in fall of odd years.)

370. *Wildlife Seminar*. II. 1 hr. per sem.; (4 hr. max.). PR: Consent. Discussion of current developments in wildlife management.

380. *Rural and Urban Wildlife Management*. II. 3 hr. PR: Consent. Management of nongame wildlife in the rural and urban environment, emphasizing habitat improvement and development and control of pest species. 2 hr. lec., 1 hr. lab. (Offered in spring of odd years.)

434. *Ecology and Management of Upland Wildlife*. I. 4 hr. PR: Consent. Ecology and management of upland game birds and mammals with emphasis on recent literature. (Offered in fall of even years.)

436. *Ecology and Management of Wetland Wildlife*. II. 4 hr. PR: Consent. Ecology and management of waterfowl and wetland furbearers with emphasis on recent research and management literature. (Offered in spring of even years.)

Wood Science (WDSC)

200. *Forest Measurement Field Practice*. S. 3 hr. PR: Wood Industry major, FOR 5, C E 1, FMAN 122. Application of surveying and mensurational practices with emphasis on field problems.

201. *Wood Industries Field Trip*. S. 1 hr. A one-week trip to observe manufacturing methods and techniques of commercial wood industry plants. Plants visited include furniture, plywood, veneer, hardboard, particle board, pulp and paper, sawmilling, and preservation.

213. *Wood Chemistry*. I. 3 hr. PR: Wood Industry major or consent; CHEM 131 or 133. Chemical composition of wood including cellulose, hemicellulose lignin and extractives. Chemical processing of wood.
222. *Harvesting Forest Products*. 3 hr. PR: MATH 4 or equiv. and WDSC 132. Analysis of ground-based and cable harvesting systems, including time and motion studies, productivity and cost analysis, occupational safety and health, environmental issues, equipment evaluation and selection, and trucking of forest products. (2 hr. lec., 1 hr. lab.)
223. *Forest Roads*. 4 hr. PR: C E 5, C S 5. Techniques of design, layout, and construction details of various standards of forest roads. (2 hr. lec., 2 hr. lab.)
230. *Wood Machining*. I. 2 hr. PR: Consent. Introduction to basic concepts of wood machining with emphasis on production equipment and furniture manufacturing.
234. *Statistical Quality Control*. I. 3 hr. PR: Forestry major or consent. Methods used to control quality of manufactured wood products. Control charts of variables and attributes. Acceptance sampling techniques.
235. *Light-Frame Wood Construction*. I. 2 hr. PR: Forestry major or consent. Use of wood in light-frame construction. Basic design procedures and construction methods.
237. *Wood Adhesion and Finishing*. II. 3 hr. PR: Wood Industry major or consent; WDSC 123 and 141. Fundamentals of the bonding and finishing of wood including preparation, processing, and evaluation of adhesive and finishing systems.
240. *Physical Behavior of Wood*. II. 3 hr. PR: WDSC 123, PHYS 1, and MATH 4. Specific gravity and density of wood; relationships between wood and liquids and applicat wood seasoning; thermal, electrical, and acoustical properties.
241. *Wood Mechanics*. 3 hr. PR: Wood industry major or consent; WDSC 123, MATH 15, and PHYS 1. Introduction to static properties of selections, elementary mechanics of deformable bodies, axial loading, column and beam analysis, and design considerations. (2 hr. lec., 1 hr. lab.)
251. *Forest Products Protection*. II. 3 hr. PR: WDSC 123. Biological organisms responsible for deterioration of wood products, their control by preservative methods, and study of fire retarding methods.
260. *Plant Layout for Wood Industries*. II. 3 hr. PR: Senior standing. Relates knowledge of wood to industrial wood product processes to optimize production. Study of proper arrangement of machines, and work and storage areas.
262. *Forest Products Decision-Making*. I. 3 hr. PR: Junior standing in Forestry. Decision-making tools and techniques used by the forest products industry such as simulation linear programming, network analysis, forecasting, game theory.
265. *Wood-based Composite Materials*. 3 hr. PR: WDSC 132, 240, and 241. Fundamentals of manufacturing wood-based composite materials, including processing, products, evaluation, and applications in the marketplace. (2 hr. lec., 1 hr. lab.)
320. *Wood Microstructure*. I. 3 hr. PR: WDSC 123; senior standing. Detailed examination of wood microstructure as it relates to processing, behavior, and identification.

340. *Advanced Physical Behavior of Wood*. I. 3 hr. PR: WDSC 240 or equiv. or consent. Physical relationships of water and wood; fluid flow through wood; thermal, electrical, and acoustical behavior of wood. Theories of wood drying and their application.

362. *Forest Products Operations Research Models*. II. 3 hr. PR: WDSC 262 and demonstrated knowledge of Fortran and Basic, or consent. Analysis of operations research models currently used by the forest products industry. Students will develop new models. (Offered in spring of even years.)

473. *Seminar in Wood Utilization*. II. 1 hr. per sem.; max. credit, 4 hr. PR: Consent. Reports and discussions of recent research in fundamental and applied phases of wood utilization.

Genetics and Developmental Biology

Joginder Nath, Chairperson of the Interdisciplinary Faculty

1120 Agricultural Sciences Building

Degrees Offered: Master of Science, Doctor of Philosophy

Areas of Emphasis

The Master of Science and Doctor of Philosophy degrees are offered in genetics and developmental biology, an interdisciplinary program involving the faculty and facilities of a number of departments in the various colleges and schools of the University. A student may concentrate in genetics or developmental biology. The areas in which emphases are offered are as follows:

Genetics—Biochemical and molecular genetics, cytogenetics, developmental genetics, immunogenetics, mutagenesis, toxicology, human genetics, plant genetics, population and quantitative genetics, and animal breeding;

Developmental Biology—Molecular aspects of development, experimental morphogenesis, teratology, regeneration, oncology, descriptive embryology, and life cycles of animals and plants.

The student may also minor in one or more other scientific fields.

Requirements

Students are expected to maintain at least a 3.0 (B) average in all work offered in fulfillment of the degree program. For a more complete statement of requirements, the student is referred to the program's Guidelines for Graduate Students in the Genetics and Developmental Biology Program.

Program Objective

The objective of this program is an increased level of understanding of modern concepts and methodologies employed in genetic and developmental biological work and to prepare a student to pursue a career in teaching and/or research. Responsibility for a student's program is vested in a graduate committee charged with arranging the student's course work, conducting examinations, and supervising the research.

Admission

To be considered for admission in the program the student must possess a baccalaureate degree from an accredited college or university, must have a grade-point average of at least a 2.75 (on a 4.0 scale), or an average of 3.0 or higher for the last 60 credit hours or an average of 3.0 or higher in all courses in sciences and mathematics.

GRE and New MCAT

The student must submit the scores of the Graduate Record Examination (GRE), or the New Medical College Admission Test (New MCAT). The student must provide three letters of reference from persons acquainted with the applicants' professional work, experiences, or academic work and submit a written statement of 500 words or more indicating the applicants' goals and objectives relative to receiving a graduate degree.

Basic training in mathematics, physics, chemistry, and biology is required for admission. Students lacking prerequisites may be accepted in a provisional status but must fulfill them before graduation. Applications for graduate study should be sent in as early in the year as possible, but not later than April 1 for entry the following August. However, applications are accepted year-round for admission to the program in the following semester. Official transcripts of baccalaureate and/or master's degrees must be sent directly to the WVU Office of Admissions and Records. Application forms can be received from the WVU Office of Admissions and Records, P.O. Box 6009, Morgantown, WV 26506-6009. For further information, write to the Chair.

Developmental Biology

The following courses in the Departments of Anatomy, Biochemistry, and Biology may be applied toward the requirements for a major in developmental biology: Anatomy 402 *Advanced Developmental Anatomy*, 405 *Experimental Embryology*, Biochemistry 491 *Advanced Study in Nucleic Acids*, Biology 214 *Molecular Basis of Cellular Growth*, Biology 309 *Molecular Biology of the Gene*, Biology 362 *Developmental Biology*, and Biology 364 *Advanced Plant Physiology*.

Genetics (GEN)

290. *Crop Breeding*. II. 3 hr. PR: GEN 171 or 321. Methods and basic scientific principles involved in improvement of leading crops through hybridization, selection, and other techniques. (Offered in spring of even years.)

321. *Basic Concepts of Modern Genetics*. I. 3 hr. PR: 8 hr. biological sciences and 1 yr. chemistry. Independent inheritance, linkage. Chemical nature of genetic material. Control of phenotype by genetic material. Gene action and coding of genetic material.

325. *Human Genetics*. II. 3 hr. PR: GEN 171 or 321 or consent. Study of genetic system responsible for development of phenotype in man. (Offered in spring of odd years.)

335. *Population Genetics*. II. 3 hr. PR: GEN 171 or 321 or consent. Relationship of gene and genotype frequencies in populations of diploid organisms, and the effects of mutation, migration, selection, assortive mating, and inbreeding in relation to single gene pairs. Application of these concepts to multigenic inheritance of quantitative traits. (Offered in fall of odd years.)

370. *Medical Genetics*. II. 2-4 hr. PR: Second-year medical student standing; graduate student in Genetics and Developmental Biology; others by consent. Introduction to clinical genetics including molecular, biochemical, and cytogenetic aspects of human biology. Application of genetic principles to human health and disease. (Also listed as CCMD 370, MED 370, PEDI 370.)

391. *Advanced Topics*. I, II, S. Variable 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

424. *Cytogenetics*. II. 4 hr. PR: GEN 171 or 321, and BIOL 215 or consent. Emphasis on macromolecules that carry information of the chromosomes, cell division, and the

cytological and molecular basis of genetics. Special attention given to visible manifestation of genes, human cytogenetics, of genomes and chromosome morphology, and their evolution. (Offered in spring of odd years.)

426. *Advanced Biochemical Genetics*. II. 3 hr. PR: GEN 171 or 321 and organic chemistry. Physiological and biophysical concepts of genetic material. Structure and arrangement of genetic units. Nucleic acids as carriers of genetic information. Gene action and amino acid coding. Biochemical evolution of genetic material. Genetic control mechanisms of mutation. (Offered in fall of even years.)

427. *Genetic Mechanisms of Evolution*. I. 3 hr. PR: GEN 171 or equiv. Molecular genetic mechanisms which result in evolutionary change. Origin of life, origin and organization of genetic variability, differentiation of populations, isolation and speciation, role of hybridization and polyploidy, and origin of man. (Offered in fall of odd years.)

450. *Seminar*. I, II. 1 hr. per sem. Recent literature pertaining to biochemical, classical, human, molecular, and cytological genetics.

497. *Research*. I, II, S. 1-15 hr.

Natural Resource Economics

Peter V. Schaeffer, Director, Division of Resource Management

Gerard D' Souza, Graduate Program Coordinator

2018 Agricultural Sciences Building

Degree Offered: Doctor of Philosophy

The Agricultural and Resource Economics Program in the Division of Resource Management offers graduate studies leading to the degree of doctor of philosophy in natural resource economics. The doctoral program offers three fields of study:

- Natural resource and environmental economics,
- Commodity market analysis modeling and forecasting, and
- International development.

Careers for which students completing the program are qualified include those with universities, research institutes, industry, and state, national, or international agencies concerned with natural resource and environmental issues.

Admission

Prospective graduate students initiate application for admission on forms available from the University Office of Admissions and Records. The completed form should be returned to the Office of Admissions and Records, accompanied by payment of the nonrefundable application fee. An official transcript from all colleges attended during an applicant's undergraduate and graduate studies must be a part of the application for admission.

Performance Standards

- An applicant must possess a master's degree and hold a grade-point average of 3.5 or above (on a 4.0 scale) in postgraduate courses.
- Scores from the Graduate Record Examination are required. A combined score of 1600 (verbal, quantitative, and analytical scores) or better is expected from applicants to the Ph.D. program.
- Applicants whose native language is not English must have obtained a minimum score of 550 on the TOEFL examination.

- Three letters of recommendation are required.
- A letter of purpose describing research interests and professional aspirations is required.

Applicants who do not meet all of the requirements above but have special qualifications may be admitted if approved by the Graduate Admission Committee, the Division Director, and the Graduate Program Coordinator. Such admission will usually be subject to conditions, however, such as taking course work to make up for deficiencies. Such make-up work will not be counted as part of credit requirements for the degree.

A limited number of graduate research assistantships are available to highly qualified students on a competitive bases. The awards are based on academic merit only.

Requirements for Research

After a student is admitted, the program coordinator will appoint a major professor to direct his/her research. Doctoral students will conduct research in support of approved projects. The student, in consultation with the major professor, will select a graduate committee during the second semester of study. The committee will consist of five or more members, the majority of whom must be WVU faculty, with at least one member representing a discipline outside the program. Each student and his/her committee will formulate a plan of study, which will be filed in the office of the program coordinator. University regulations concerning committee members require that a majority of the graduate committee, including the major professor, must be regular members of the WVU graduate faculty.

Core Courses

Doctoral students must satisfactorily complete a set of core courses in economic theory, quantitative methods, and resource analysis before they will be admitted to candidacy for the Ph.D. degree. All core courses will be at the 300- or 400-level. Certain course requirements may be waived if the student has received equivalent training in prior course work. Additional required course work pertaining to the student's area of specialization will be determined by the student's major professor and graduate committee.

Fields of Study

There are three fields of study: natural resource and environmental economics; commodity analysis, modeling, and forecasting; and international development. Doctoral students must select two fields subject to approval by the student's major professor and graduate committee. The student will be required to successfully complete a minimum of three courses at the 300 or 400 level in each field selected.

Admission to Candidacy

Oral and written qualifying examinations will be administered by the qualifying examination committee before the end of the second year following admission to the program. Upon satisfactory completion of the qualifying examinations and core course requirements, the student will be eligible for admittance to candidacy for the Ph.D. in natural resource economics.

Completion

Each candidate for the Ph.D. degree will be expected to meet the following general requirements:

- A minimum of two years in residence,
- Successful completion of qualifying examinations and examinations in two fields of study,
- A dissertation, and
- Successful oral defense of the dissertation.

Although not a requirement, presentation of research results at a meeting of a professional society and submission of manuscripts for publication are encouraged.

Agricultural and Resource Economics (ARE)

201. *Applied Demand Analysis*. II. 3 hr. Consumer demand economics applied to environmental, natural resource, and agricultural issues; analysis of factors that influence demand and determine prices; special applications to non-market, environmental, and natural resource amenities.

202. *Applied Production Economics*. I. 3 hr. Production economics applied to agricultural, environmental, and natural resource issues; production, multiple-product and cost functions, and joint production; effects of environmental and natural resource management regulations on the production process.

206. *Agribusiness Planning*. I. 3 hr. PR: AGE 104 or consent. Application of economic and management principles to agribusiness planning; consideration of risk and uncertainty in agribusiness planning; formulation of economic models for determining optimum allocation of resources for production processes.

210. *Environmental and Resource Economics*. I. 3 hr. PR: ARE 201 and 202; or ECON 211; or consent. Economic analysis of natural resource and environmental problems; management of renewable and nonrenewable resources and environmental amenities; market failure, externalities, benefit-cost and risk analysis; property rights and the "taking" issue.

211. *Rural Economic Development*. I. 3 hr. Economic trends, development policies, and analysis of rural economies in the United States. Rural diversity, development concepts, rural planning, public programs and policies, and community analysis methods.

220. *Agricultural Cooperatives*. I. 3 hr. History, principles, organization, management, taxation, and legal aspects of agricultural, marketing, supply and service cooperatives in the U.S. Development of non-agricultural cooperatives. (Offered in fall of odd years.)

231. *Marketing Agricultural Products*. II. 3 hr. Organization, functions, and analysis of the agricultural marketing system. Food consumption, exports, price analysis, marketing costs, market power, commodities futures market, food safety, and government regulations.

235. *Marketing Livestock Products*. I. 3 hr. Livestock marketing practices and policies. Supply and demand, livestock price cycles, grading, marketing alternatives, processing and retailing. Economic analysis of alternatives, current issues and trends. (Offered in fall of even years.)

240. *Futures Markets and Commodity Prices*. I. 3 hr. Analysis of price-making forces which operate in the market place; emphasis on major agricultural and mineral commodity and futures markets.

245. *Energy Economics*. II. 3 hr. Analysis of the energy sector and its relationship to the rest of the economy; energy security, deregulation, full cost pricing, substitutability among energy sources, transmission, new technologies, environmental considerations.

250. *Agricultural, Environmental and Resource Policy*. II. 3 hr. PR: ARE 201, 202; or ECON 211; or consent. Economic analysis of agricultural, natural resource and environ-

mental policies; problems of externalities and market failure, and alternative policies for addressing such problems; benefits and costs of alternative policies.

261. *Agribusiness Finance*. II. 3 hr. An overview of financial analysis and the application of financial principles to small, rural and agricultural businesses. Includes applications of financial analysis computer software.

300. *Applied Microeconomics* I. 3 hr. PR: ECON 211 and 220 or equiv. Producer and consumer economics used in resource, environmental, and agricultural economic analysis.

321. *Quantitative Methods in Resource Economics*. I. 3 hr. PR: ECON 220 or equiv. Optimization techniques in economic analysis of natural resources; environmental and agricultural management problems; linear, nonlinear and dynamic programming.

324. *Econometric Methods in Resource Economics*. I. 3 hr. PR: ECON 226. Application methods to natural resource, environmental, and agricultural economic problems; single and simultaneous equation models, specification problems, topics in time series, and cross-sectional analysis.

329. *Resource Commodity Markets*. II. 3 hr. PR: ECON 325 and 326 or consent. Advanced econometric methods of specification, estimation and simulation of domestic and international resource markets and industries; time series and forecasting techniques.

330. *Production Economics*. II., 3 hr. PR: ARE 300 and 321. Developments in producer economics applied to natural resource, environmental, and agricultural issues.

332. *Natural Resource and Environmental Economics*. II. 3 hr. PR: ARE 300 and 321 or equiv. Theory and institutions; market failure, externalities and property rights issues; renewable and nonrenewable resources, common property, environmental and resource management, and intergenerational decisions.

333. *Natural Resource Policy Analysis*. I. 3 hr. PR: ARE 300 and 321 or equiv. Welfare economics applied to the analysis and evaluation of natural resource, environmental, agricultural, and energy policy issues.

340. *Rural and Regional Development*. II. 3 hr. PR: ARE 300 and 321. Economic theories and quantitative techniques. Problems and goals for rural and regional planning; methods of policy analysis for community infrastructure development.

342. *International Agricultural Economic Development*. I. 3 hr. Current problems, theories, policies, and strategies in planning for agricultural and rural development for increased food production and to improve the well-being of rural people in the developing countries of the world.

343. *Project Analysis & Evaluation*. II. 3 hr. PR: Consent. Design, analysis, and evaluation of development projects; economic and financial aspects of project analysis; risk analysis; preparation of feasibility reports.

344. *International Markets and Trade*. I. 3 hr. PR: ARE 300 and 321. Causes and consequences of international trade and investment; commodity market structures, commodity price instability and international agreements; trade barriers and protection, export promotion, and impacts on developing countries.

365. *Mineral Finance*. II. 3 hr. Methods, risks, and problems of financing mineral projects. Large foreign-project financing, concerns of host governments, multinational mining concerns, and financial institutions.

380. *Energy Industry Economics*. II. 3 hr. PR: Graduate standing. Technical production and consumption methodologies, environmental concerns, and national and global economics and politics in making energy decisions.

381. *Resource Appraisal and Decision Making*. II. 3 hr. PR: ARE 300 or equiv. Investment analysis, decision making under risk and uncertainty, and project analysis applied to resource exploration and utilization; mineral and energy reserve and resource estimation techniques.

382. *Mineral Industry Economics*. II. 3 hr. Supply, demand, structure, technology, costs, prices, and problems of mineral industries.

403. *Advanced Natural Resource Economic Theory*. I. 3 hr. PR: ECON 310 and ARE 332. Allocation and distribution of natural resources in static and dynamic contexts; welfare economics, cost-benefit analysis, and optimal control approaches; applications to resource valuation, exhaustion, taxation, and regulation in theory and practice.

410. *Advanced Environmental Economics*. II. 3 hr. PR: ECON 310 and ARE 332 or consent. Theory, efficient environmental design and analysis, modeling of economic and environmental systems, evaluation of non-market benefits and costs, and risk assessment.

446. *Energy and Regional Development*. II. 3 hr. PR: ECON 355 and ARE 380. Energy in the West Virginia economy and selected regions of the United States.

483. *Minerals Technology Assessment*. II. 3 hr. PR: Consent. Methods of studying the effects of modifications in technology on the production of utilization of minerals, and the effects on mineral demand, supply, substitution and markets.

484. *Oil and Gas Industry Economics*. II. 3 hr. PR: Consent. Geology, engineering, and economic theories of evaluating industry structures and performance.

485. *Economics of the Coal Industry*. Supply, demand, structure, production technology, costs, prices, and problems of the coal industry. Includes environmental, productivity, and transportation issues.

495. *Independent Study*. I, II. 1-4 hr. PR: Consent. Faculty-supervised study of topics not available through regular course offerings.

498. *Thesis/Dissertation Research*. I, II. 1-15 hr. PR: Consent.

Resource Management (RESM)

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent.

496. *Graduate Seminar*. I, II, S. 1 hr. PR: Consent.

497. *Research*. I, II, S. 1-15 hr.

Plant and Soil Sciences

Barton S. Baker, Director, Division of Plant and Soil Sciences and Graduate Program Coordinator

1090 Agricultural Sciences Building

Degree Offered: Master of Science

Areas of Emphasis

The Master of Science degree in Plant and Soil Sciences is offered to students who wish to study crops agronomy, entomology, environmental microbiology, horticulture, plant pathology, or soil science.

Program Objective

The objective of the M.S. in Plant and Soil Sciences is to provide students the opportunity to take courses and conduct original, master-level research in their areas of specialization. The educational experience obtained through courses and research is expected to provide students with the background and expertise to enter doctoral programs or professional careers as agronomists, microbiologists, horticulturists, and plant pathologists. These disciplines are critical to maintain agriculture and forest productivity, solve environmental problems and promote economic development in the state.

Admission and Performance Standards

In order for a student to be admitted to the program, the following admission criteria will be considered. The applicant normally must:

- Possess a baccalaureate degree,
- Have a minimum undergraduate grade point average of 2.75 (3.0 for acceptance as a regular graduate student.),
- Have an adequate academic aptitude at the graduate level as measured by the Graduate Record Examination (GRE) or other tests/evidence,
- Provide three letters of reference from persons acquainted with the applicant's professional work, experience, or academic background, and
- Submit a written statement of approximately 500 words indicating the applicant's goals and objectives relative to receiving a graduate degree.

International students have the additional requirement to submit a minimum score of 550 on the TOEFL examination if their native language is not English. Interviews are encouraged but not required.

Students enrolled in the M.S. in Plant and Soil Sciences must complete STAT 311, 312, ENGL 208 (Technical writing), or other comparable course, and three semesters of seminar in their area of emphasis. Other class requirements will be determined by the student's graduate committee and made a part of the student's plan of study. This degree requires a minimum of 30 graduate credit hours, six of which may be research.

Each student must develop a plan of study, conduct original research and prepare a thesis. The plan of study which is to be developed within the first year of study must contain the courses to be taken plus an outline of the research to be conducted. The thesis must be satisfactorily defended in an oral examination given by the student's graduate committee.

Agronomy (AGRN)

Crop Science Courses

251. *Weed Control*. 1. 3 hr. PR: PLSC 52, AGRN 2, or consent. Fundamental principles of weed control. Recommended control measures for and identification of common weeds. 2 lec., 1 lab. (Offered in fall of odd years.)

252. *Grain and Special Crops*. II. 3 hr. PR: PLSC 52, AGRN 2, or consent. Advanced study of methods in the production of grain and special crops. Varieties, improvement, tillage, harvesting, storage, and use of crops grown for seed or special purposes. (Offered in spring of even years.)

254. *Pasture and Forage Crops*. I. 4 hr. PR: PLSC 52, AGRN 2, or consent. All phases of pasture and forage crop production, including identification, seeding, management, use, seed production, and storage of forage crops. 3 lec., 1 lab.

325. *Forage Harvesting and Storage*. 3 hr. PR: AGRN 254, or consent. Advanced study of processes associated with harvesting and storage of forages. 3 hr. lec. (Offered in fall of odd years.)

354. *Pasture Management and Utilization*. 3 hr. PR: AGRN 254 and ANNU 101, or consent. Advanced study of pastures and their management and utilization with emphasis on temperate species. 3 hr. lec. (Offered in spring of odd years.)

374. *Tropical Grasslands*. 3 hr. PR: AGRN 254 and ANNU 101, or consent. Advanced study of tropical grasslands and their management and utilization in animal production. (Offered in fall of even years.)

432. *Forage Chemistry and Quality*. 3 hr. PR: ANNU 301 and AGRN 254, or consent. Advanced course in chemistry and biochemistry of pastures and forages, emphasizing factors affecting their quality and principles governing their utilization by herbivorous animals. (Also listed as ANNU 432.) (Offered in spring of even years.) (3 hr. lec.)

Agronomy (AGRN)

Soil Sciences Courses

210. *Soil Fertility*. I. 3 hr. PR: AGRN 2 or 10. Soil properties in relation to fertility and productivity of soils; scrutiny of essential plant nutrients; use of fertilizers and lime; evaluation of soil fertility.

212. *Soil Conservation and Management*. I. 3 hr. PR: AGRN 2 or 10. Using soil technology to solve soil management problems relating to cropping systems. Field diagnosis of soil problems stressed. 2 lec., 2 lab.

215. *Soil Survey and Land Use*. I. 3 hr. PR: AGRN 2 or 15 or consent. Identification of morphological characteristics and taxonomic units of soils; techniques of writing soil pedon and mapping unit descriptions; techniques of preparing soil maps; evaluation of soils for land use planning. (2 hr. lec., 3 hr. lab.) (Offered fall of odd years.)

217. *Soil Genesis and Classification*. I. 4 hr. PR: AGRN 2 or 15 or consent. Origin and formation of soils; principles of soil classification; study of soil pedons and polypedons; influence of soil-forming factors and processes. Two Saturday field trips required. (3 hr. lec., 3 hr. lab.) (Offered fall of even years.)

230. *Soil Physics*. II. 3 hr. PR: AGRN 2 or 10. Physical properties of soils; water and air relationships and their influence on soil productivity. (Offered in spring of even years.)

255. *Reclamation of Disturbed Soils*. 3 hr. PR: Junior standing or above and consent. Pedologic definitions and principles will be applied to advanced planning and analysis,

handling and placement, reclamation and revegetation practices, and continuing use of disturbed soils resulting from mining and urbanization activities. (Field trip required.)

352. *Pedology*. II. 3 hr. PR: AGRN 217 or consent. Genesis and evolution of soils considered as natural bodies; including both macro- and micromorphological properties. Saturday field trips required. 2 hr. lec., 1 hr. lab. (Offered in spring of odd years.)

410. *Advanced Soil Fertility*. II. 3 hr. PR: AGRN 210, BIOL 169 or consent. Influence of soil chemical and physical properties on availability of plant nutrients; intensive study of individual plant nutrients and interactions of nutrients in soils and crops. (Offered in spring of even years.)

416. *Soil Chemistry*. I. 3 hr. PR: Consent. Chemistry of soil development; chemical and mineralogical composition of soils; nature and properties of organic and inorganic soil colloids; cation and anion exchange phenomena; soil chemistry of macro- and micro-nutrients. (Offered in fall of odd years.)

418. *Chemistry of Soil Organic Matter*. II. 3 hr. PR: Organic chemistry or consent. Chemical composition of soil organic matter studied in relation to its physico-chemical properties and humus formation. Methods involving extraction, fractionation, and purification of soil organic components examined. 2 lec., 1 lab. (Offered in spring of odd years.)

421. *Identification of Clay Minerals in Soil*. II. 3 hr. PR: Physical chemistry or consent. Characterization of clay minerals is an important aspect in soils, geology, civil engineering, and related fields. Study of methods used in qualitative and quantitative identification of these secondary minerals in soils and rocks. 1 lec., 2 lab. (Offered in spring of even years.)

Plant Science (PLSC)

420. *Special Topics*. I, II, S. 1-6 hr. Special study in environmental microbiology, crop science, horticulture, plant pathology, or soil science.

450. *Seminar*. I, II. 1 hr. Graduate seminar in environmental microbiology, crop science, horticulture, plant pathology, or soil science.

497. *Research*. I, II, S. 1-15 hr. Graduate research in environmental microbiology, crop science, horticulture, plant pathology, or soil science.

Reproductive Physiology

E. Keith Inskeep, Chairperson of the Interdisciplinary Faculty
G-044 Agricultural Science Building

Degrees Offered: Master of Science: Doctor of Philosophy

Requirements

The graduate program in reproductive physiology, leading to master's and doctoral degrees, is interdisciplinary, with faculty located in the Departments of Animal and Veterinary Sciences, Biology, Obstetrics and Gynecology, Pharmacology and Toxicology, Physiology, and Plant and Soil Sciences. Requirements for admission include at least a 2.75 grade-point average (4.0 system) and completion on the following prerequisites with a grade of C or better in each: calculus, genetics, organic chemistry, physics, and vertebrate embryology. It is recommended, but not required, that applicants complete both the

aptitude and the advanced tests of the Graduate Record Examination. Foreign languages are not required for a degree in reproductive physiology. Only a limited number of students are accepted each year.

Research

Research topics include function and regression of the corpus luteum, aging of the oocyte, control of postpartum reproductive performance, environmental factors in reproduction, control of steroidogenesis, control of estrus and ovulation, new methods of artificial insemination, ovarian follicular development, endocrine functions of polypeptides, and roles of prostaglandins in reproduction.

Research is almost entirely with farm animals including poultry.

Courses

The program draws on courses offered in various departments and includes courses in endocrinology, advanced reproductive physiology, biochemistry, physiology, statistics, and developmental embryology.

Eberly College of Arts and Sciences

Gerald E. Lang, Ph.D., Dean (currently serving as WVU Interim Provost)

Rudolph P. Almasy, Ph.D., Associate Dean (currently serving as Acting Dean of the Eberly College)

Frank J. Calzonetti, Ph.D., Associate Dean

Nicholas G. Evans, Ed.D., Associate Dean

John F. Schnabel, Ph.D., Associate Dean

Joan S. Gorham, Ph.D., Interim Associate Dean

Asuntina S. Levelle, J.D., Assistant Dean

The Eberly College of Arts and Sciences is West Virginia University's largest college, with 325 faculty in academic departments and program areas in literature and the humanities, social and behavioral sciences, and mathematics and natural sciences. The college supports 16 graduate programs, ten of which include doctoral programs; its departments occupy 12 buildings on the downtown campus. Many of the faculty enjoy distinguished national and international reputations and have been honored for excellence in teaching, research, and service. Their awards not only acknowledge extreme dedication but also accentuate the relationship between the faculty and the students. Graduate students often collaborate with faculty on specialized research projects which lead to publications in national and international journals. In 1995, the faculty of the college produced over 300 publications, delivered 315 professional presentations, and received 112 grants and contracts, 50 professional association citations, and 49 academic honors. In recent years, Arts and Sciences faculty have generated over \$6,000,000 annually in external support for research and instruction.

The Eberly College of Arts and Sciences offers doctoral programs in biology, chemistry, computer science, English, geography, geology, history, mathematics, physics, political science, and psychology. Available research or teaching concentrations are as follows:

- Biology—cellular and molecular biology, environmental plant biology.
- Chemistry—analytical, inorganic, organic, physical, and theoretical chemistry.
- Computer science—artificial intelligence, operating systems, programming languages, mathematics of computing, databases, and software engineering.
- English—literature.
- Geography—regional development, geographic information systems.
- Geology—energy (basin analysis), environmental geology.
- History—United States (Appalachia), Europe, Africa, science and technology.
- Mathematics—selected areas of pure, applied, and discrete mathematics.
- Physics—condensed matter, applied physics, plasma physics, astrophysics, electro-optics, and elementary particle physics.
- Political science—public policy analysis (domestic and international).
- Psychology—behavior analysis, developmental psychology, and clinical psychology.

Graduate programs leading to a master's degree are available in biology, chemistry, communication studies, computer science, English, foreign languages, geography, geology, history, liberal arts, mathematics, physics, psychology, public administration, sociology and anthropology, and statistics. Each program prepares students for further study or for productive roles in professional environments. Information concerning graduate programs in the Eberly College of Arts and Sciences may be obtained by contacting Associate Dean for Research and Graduate Studies, Eberly College of Arts and Sciences, 201 Woodburn Hall, West Virginia University, P.O. Box 6286, Morgantown, WV 26505-6286; telephone (304) 293-4611.

Graduate Programs

Biology	M.S.	Ph.D.
Chemistry	M.S.	Ph.D.
Communication Studies	M.A.	
Computer Science	M.S.	Ph.D.
English	M.A.	Ph.D.
Foreign Languages	M.A.	
Geography	M.A.	Ph.D.
Geology	M.S.	Ph.D.
History	M.A.	Ph.D.
Mathematics	M.S.	Ph.D.
Physics	M.S.	Ph.D.
Political Science	M.A.	Ph.D.
Psychology	M.A.	Ph.D.
Public Administration	M.P.A.	
Sociology and Anthropology	M.A.	
Statistics	M.S.	

Graduate Faculty

† Indicates regular member of graduate faculty.

* Indicates associate member of graduate faculty.

Biology

Professors

David F. Blaydes, Ph.D. (Ind. U.). Plant physiology, Cytokinins.

Edward C. Keller, Jr., Ph.D. (Penn. St. U.), Ecology, Genetics.

†Gerald E. Lang, Ph.D. (Rutgers U.). Interim Provost. Dean. Plant ecology, Biogeochemistry, Wet land ecology.

†James B. McGraw, Ph.D. (Duke U.). Plant ecology, Plant population biology.

*Richard P. Sutter, Ph.D. (Tufts U.). Cellular/molecular biology, developmental biology, molecular genetics.

Associate Professors

† Ramsey Frist, Ph.D. (U. Pitt.). Biophysics.

†Keith Garbutt, Ph.D. (U. Wales). Chairperson. Population genetics, Plant ecology.

Assistant Professors

†Clifford P. Bishop, Ph.D. (U. Va.). Developmental and molecular biology of drosophila.

†Jonathan R. Cumming, Ph.D. (Cornell U.). Plant physiology, Rhizosphere ecology.

†Dorothy C. Dunning, Ph.D. (Tufts U.). Bat prey defenses and other aspects of bat biology.

†Jorge A. Flores, Ph.D. (George Wash. U.). Endocrinology of reproduction, Signal transduction.

†Philip E. Keeting, Ph.D. (U. Md, Nj-Nj Med. Sch.). Molecular endocrinology.

†William T. Peterjohn, Ph.D. (Duke U.). Biogeochemistry, Ecosystem ecology.

†Jeffrey L. Price, Ph.D. (Johns Hopkins U.). Drosophila genetics, Circadian rhythms.

†Richard B. Thomas, Ph.D. (Clemson U.). Physiological plant ecology, Global environmental change.

†Ray Thweatt, Ph.D. (U. of Texas Health Sci. Cnter). Cellular senescence, Molecular biology of aging.

Chemistry

Professors

†Nar S. Dalal, Ph.D. (U. Brit. Columbia). Physical chemistry, Magnetic resonance, Fossil fuels.

*William R. Moore, Ph.D. (U. Minn.). Organic chemistry, Strained molecules, Reaction mechanisms.

†Robert S. Nakon, Ph.D. (Tex. A&M U.). Bioinorganic chemistry, Chelates, Catalysis.

†Jeffrey L. Petersen, Ph.D. (U. Wisc.). Physical inorganic chemistry, Organometallic chemistry, X-ray diffraction, catalysis, olefin polymerization.

†Kenneth Showalter, Ph.D. (U. Colo.). Eberly Family Professor of Physical Chemistry, Chemical kinetics, Multistability and oscillating systems.

[†]Kung K. Wang, Ph.D. (Purdue U.). Organic chemistry, Stereoselective synthesis, Natural products.

Associate Professors

[†]Harry O. Finklea, Ph.D. (Calif. Inst. Tech.). Analytical/physical chemistry, Properties of organized monolayers deposited on electrodes.

[†]Charles Jaffe, Ph.D. (U. Col.). Theoretical chemistry, Molecular dynamics, Nonlinear mechanics.

[†]Paul W. Jagodzinski, Ph.D. (Tex. A&M U.). Chairperson. Physical chemistry, Raman spectroscopy, Molecular spectroscopy.

[†]John H. Penn, Ph.D. (U. Wisc.). Organic chemistry, Photochemistry, Electron transfer.

[†]Reuben H. Simoyi, Ph.D. (Brandeis U.). Physical chemistry, Chemical kinetics, Oscillating reactions.

[†]Ronald B. Smart, Ph.D. (U. Mich.). Associate Chairperson. Environmental analytical chemistry, Electrochemistry, Trace metals.

[†]Alan M. Stolzenberg, Ph.D. (Stanford U.). Inorganic chemistry, Bioinorganic chemistry, Organometallic chemistry.

Assistant Professors

[†]Kay M. Brummond, Ph.D. (Penn State U.). Synthetic organic chemistry, synthetic methods, natural products synthesis.

[†]Katharine J. Covert, Ph.D. (Cornell U.). Inorganic and organometallic chemistry; Synthesis, kinetics, and reaction mechanisms.

[†]Fred L. King, Ph.D. (U. Va.). Analytical chemistry, Mass spectrometry, Gas-phase ion chemistry.

Debra L. Mohler, Ph.D. (U. Cal-Berkeley). Organic chemistry, Bioorganic and bioorganometallic chemistry, Nanostructures.

Vincent T. Remcho, Ph.D. (Va. Tech.). Analytical chemistry, Chemical separations, Chromatography, electrophoresis.

Bjorn C. Soderberg, Ph.D. (Royal Inst. of Tech.-Stockholm). Organic and organometallic chemistry, Synthetic methods, Natural product synthesis.

Communication Studies

Professors

[†]James C. McCroskey, Ed.D. (Penn. St. U.). Chairperson. Communication avoidance, Communication in instruction, Interpersonal and organizational communication.

[†]Virginia P. Richmond, Ph.D. (U. Nebr.). Interpersonal and organizational communication, Nonverbal communication, Communication in instruction.

Associate Professors

[†]Melanie Booth-Butterfield, Ph.D. (U. Mo.). Interpersonal communication, Nonverbal communication, Communication in instruction.

[†]Steven Booth-Butterfield, Ed.D. (WVU). Mass communication, Interpersonal communication, Communication in instruction, Persuasion.

[†]Joan S. Gorham, Ed.D. (Northern Ill. U.). Interim Associate Dean. Communication in instruction, Nonverbal communication, Mass communication.

Assistant Professors

[†]Robert A. Barraclough, Ed.D. (WVU). Communication in instruction, Intercultural communication, Interpersonal communication, Organizational communication.

^{*}Stephen C. Hines, Ph.D. (Purdue U.). Interpersonal communication, Persuasion, Research methods.

[†]Matthew M. Martin, Ph.D. (Kent St. U.). Argumentation, Personality differences, Interpersonal and family communication.

[†]Brian Patterson, Ph.D. (U. Okla.). Interpersonal communication, Nonverbal communication, Health communication.

English

Professors

[†]Timothy D. Adams, Ph.D. (Emory U.). American autobiography, American literature, American studies.

[†]Dennis Allen, Ph.D. (U. Minn.). Critical theory, Prose fiction, Popular culture.

[†]Patrick Conner, Ph.D. (U. Md.). Chairperson. Anglo-Saxon literature and culture, Medieval English literature, Humanities computing.

[†]Richard B. Eaton, Jr., Ph.D. (U. N.C.). 19th-and 20th-century American literature, Eugene O'Neill.

[†]William W. French, Ph.D. (U. Pitt.). Shakespeare and Renaissance drama and literature, Contemporary theatre, Modern American and British drama.

- Elaine Ginsberg, Ph.D. (U. Okla.). M.A. Supervisor. American literature, Women writers, Feminist theory.
- Robert Markley, Ph.D. (U. Penn.). Jackson Family Chair in British Literature, Restoration and 18th-century literature, Science studies, Cultural studies.
- *Brian McHale, Ph.D. (Oxford). Ph.D. Supervisor. Eberly Family Professor of American Literature. Postmodernism, American literature, Cultural studies.
- *Thomas H. Miles, Ph.D. (SUNY—Binghamton). Scientific and technical writing, Rhetoric, Online distance learning.
- *Frank Scafella, Jr., Ph.D. (U. Chicago). American novel, American romantics, Literature and religion, Science fiction/fantasy.
- *Judith G. Stitzel, Ph.D. (U. Minn.). Women's studies, Feminist pedagogy, Creative writing.
- *Cheryl B. Torsney, Ph.D. (U. Fla.). American fiction, Henry James, Literary theory, Women writers.

Associate Professors

- *Rudolph P. Almasy, Ph.D. (U. Minn.). Acting Dean. Renaissance and Reformation studies, Composition.
- *Anna Shannon Elfenbein, Ph.D. (U. Nebr.). American literature. Women's studies, Film.
- *Avery F. Gaskins, Ph.D. (Ind. U.). Romantic literature, Appalachian literature, Folklore.
- *Byron C. Nelson, Ph.D. (U. Wisc.). Ranters and religious radicals, Elizabethan, Jacobean, and Restoration drama.
- *Kevin Oderman, Ph.D. (U. Calif.). American poetry, American literature, Creative writing: essay.
- *Susan Shaw Sailer, Ph.D. (U. Wash.). Irish poetry, James Joyce, Literary theory, Epics.
- *Hayden Ward, Ph.D. (Columbia U.). Editor, *Victorian Poetry*, Victorian literature, Walter Pater, 19th-century American literature.

Assistant Professors

- *Gail Adams, Ph.D. (U. Texas). American studies, Creative writing.
- *Laura Brady, Ph.D. (U. Minn.). Composition and rhetorical theory, Women's studies.
- John Flynn, Ph.D. (Carnegie-Mellon). Creative writing, Contemporary American poetry.
- *Marilyn Francus, Ph.D. (Columbia U.). Restoration and 18th-century literature and culture, Women's studies, Satire, History of the novel.
- James Harms, M.F.A. (Indiana U.). Creative writing (poetry), Contemporary poetry.
- *John Lamb, Ph.D. (NYU). Assistant Editor, *Victorian Poetry*, Victorian literature and culture, Victorian historiography.
- *D. Vance Smith, Ph.D. (U. Virginia). Middle English, Cultural studies.
- *Ethel Morgan Smith, M.A. (Hollins College). Creative writing: fiction, Nonfiction essay, African-American literature.
- *David Stewart, Ph.D. (Oxford U.). British romanticism, Literary theory.
- *Timothy Sweet, Ph.D. (U. Minn.). American studies (17th-19th-century), Literature and photography, Native American literature.

Foreign Languages

Professors

- *Robert J. Elkins, Ph.D. (U. Kans.). *Emeritus*. German. Language methodology, German radio plays, English as a second language.
- *Kathleen E. McNerney, Ph.D. (U. N. Mex.). Catalan language and literature, Spanish literature and culture.
- *Frank W. Medley, Jr., Ph.D. (Purdue U.). Chairperson. Spanish, Foreign language education.
- *Joseph A. Murphy, Ph.D. (Ohio St. U.). Associate Chairperson. French. English as a second language, Foreign language education.
- *Joseph J. Prentiss, Ph.D. (U. Pitt.). Classics. Greek and Latin literature, Classical mythology.
- *Janice Spleth, Ph.D. (Rice U.). French, Francophone literature and culture.

Associate Professors

- *Marilyn Bendena, Ph.D. (Wayne St. U.). French, Russian. Russian literature/culture, Contemporary French novel.
- *Axel W. Claesges, Ph.D. (Vanderbilt U.). German. German cultural and intellectual history, 19th-century literature, Commercial German.
- *Ahmed Fahkri, Ph.D. (U. Mich.). TESL. Second language acquisition, Applied linguistics, Discourse analysis.
- *Pablo Gonzalez, Ph.D. (U. Madrid). Spanish. Spanish-American literature, Commercial Spanish.

- †Michael Lastinger, Ph.D. (U. Ga.). French. 19th century French literature, Critical theory.
- †Valerie Lastinger, Ph.D. (U. Ga.). French. 18th century French literature, French women writers.
- †Michael E. Reider, Ph.D. (U. Iowa). Spanish, Linguistics. Syntax and phonology, Psycholinguistics.
- *Joseph F. Renahan, M.S. (Yeshiva U.). Spanish. French and Spanish philology, Spanish Golden Age drama.
- †Jurgen Schlunk, Ph.D. (U. Marburg). German. 18th century German literature, 19th and 20th century German drama.

Assistant Professors

- *Maria Amores, Ph.D. (Penn St. U.). Spanish, Foreign language acquisition.
- *Susan Bradi, Ph.D. (U. Del.). ESL, Applied linguistics, Second language acquisition, Syntax.
- †Jeffrey Bruner, Ph.D. (Rutgers U.). Graduate coordinator. Modern Spanish peninsular literature.
- *Sandra Dixon, Ph.D. (Brown U.). Spanish, Portuguese literature, Spanish-American literature.
- †Daniel Ferreras, Ph.D. (Mich. St. U.). Comparative Romance literature. French/Spanish 19th and 20th century novel, Theory of the fantastic.
- †Deborah Janson, Ph.D. (U. Cal.). German. The Enlightenment, Romanticism, 20th Century literature, GDR literature, Ecofeminism.
- †Twyla Meding, Ph.D. (U. Va.). French. 16th and 17th century French literature, The pastoral novel.
- †Johan Seynnaeve, Ph.D. (Cornell U.). General linguistics, Sociolinguistics, Phonology.
- †Sharon Wilkinson, Ph.D. (Penn St. U.). French, Foreign language acquisition.

Geology and Geography

Professors

- *Robert E. Behling, Ph.D. (Ohio St. U.). Geomorphology.
- †Frank J. Calzonetti, Ph.D. (U. Okla.). Associate Dean for Research and Graduate Studies, WV EPSCOR Director. Energy and regional development, Industrial location.
- †Alan C. Donaldson, Ph.D. (Penn. St. U.). *Emeritus*. Sedimentation-stratigraphy.
- †Gregory A. Elmes, Ph.D. (Penn. St. U.). GIS, Spatial modeling, Energy and environment.
- †Milton T. Heald, Ph.D. (Harvard U.). *Emeritus*. Mineralogy and petrology.
- Andrew Isserman, Ph.D. (U. Penn.). Regional research.
- †Thomas W. Kammer, Ph.D. (Ind. U.). Paleontology.
- †Kenneth C. Martis, Ph.D. (U. Mich.). Political geography, Historical geography.
- *Henry W. Rauch, Ph.D. (Penn St. U.). Hydrogeology and geochemistry.
- †John J. Renton, Ph.D. (WVU). Geochemistry.
- †Robert C. Shumaker, Ph.D. (Cornell U.). Geophysics.
- †Richard A. Smosna, Ph.D. (Ill. U.). Carbonate sedimentation.
- †Thomas H. Wilson, Ph.D. (WVU). Geophysics.

Associate Professors

- †Robert Q. Hanham, Ph.D. (Ohio St. U.). Urban and regional systems, Research methods.
- †Ronald Harris, Ph.D. (V. College, London). Structural geology.
- †Trevor M. Harris, Ph.D. (U. Hull). Chairperson. Geographic information systems.
- †J. Steven Kite, Ph.D. (U. Wisc.). Geomorphology.
- †Helen Lang, Ph.D. (U. Ore.). Petrology and mineralogy.
- †Daniel Weiner, Ph.D. (Clark U.). Development geography, Political ecology, Africa.

Assistant Professors

- †Joseph Donovan, Ph.D. (Penn. St. U.). Hydrogeology and geochemistry.
- †Calvin Masilela, Ph.D. (VPI). Planning, International development and land use policy.
- †Ann M. Oberhauser, Ph.D. (Clark U.). Industrial development, Gender studies, Europe.
- †Timothy A. Warner, Ph.D. (Purdue U.). Remote sensing.

History

Professors

- †Wesley M. Bagby, Ph.D. (Columbia U.). Recent United States. U.S. diplomatic.
- †Robert E. Blobaum, Ph.D. (U. Nebr.). Associate Chairperson. Modern Europe, East Europe, Poland, Russia.
- †Emory L. Kemp, Ph.D. (U. Ill.). *Emeritus*. History of technology, industrial archaeology, 19th-century engineering.

†Ronald L. Lewis, Ph.D. (U. Akron). Chairperson. Modern United States. West Virginia/Appalachia, Social/Labor.

†Robert M. Maxon, Ph.D. (Syracuse U.). Africa. East Africa, Economic and imperial.

†John C. Super, Ph.D. (UCLA). Associate Chairperson. Latin America, Spain, Biography, Food and agriculture.

Associate Professors

†William S. Arnett, Ph.D. (Ohio St. U.). Ancient, Egyptology, Middle East.

†Helen M. Bannan, Ph.D. (Syracuse U.).

†Amos J. Beyan, Ph.D. (WVU). West Africa.

†Elizabeth Fones-Wolf, Ph.D. (U. Mass.). Modern United States, 20th century social and economic.

†Gregory A. Good, Ph.D. (U. Toronto). History of science.

†Jack L. Hammersmith, Ph.D. (U. Va.). Modern United States. East Asia, U.S. diplomatic, U.S.-Japanese relations.

†Barbara J. Howe, Ph.D. (Temple U.). Public history, Modern United States. U.S. urban and women's history.

†Mary Lou Lustig, Ph.D. (Syracuse U.). Early United States. Colonial, Revolutionary, Constitutional.

†Stephen C. McCluskey, Ph.D. (U. Wisc.). Medieval science and technology, Astronomies of non-literate cultures.

†John R. McKivigan, Ph.D. (Ohio St. U.). 19th Century United States. Civil War Reconstruction, Reform, Ethnic.

†A. Michal McMahon, Ph.D. (Texas). History of Technology.

Assistant Professors

Kenneth Fones-Wolf, Ph.D. (Temple U.). Labor studies, U.S. labor. Adjunct.

†Caroline Litzenger, Ph.D. (Cambridge U.).

Jose Pimienta-Bey, Ph.D. cand. (Temple U.). West Africa, African-American.

†Mark Tauger, Ph.D. (U.C.L.A.). Russian/Soviet, Environmental history.

†Steven M. Zdatny, Ph.D. (U. Penn.).

Visiting Assistant Professor

†Steven J. Ericson, Ph.D. (Harvard). Japan.

Mathematics

Professors

†Ian Christie, Ph.D. (Dundee U.). Numerical partial differential equations.

†Harvey R. Diamond, Ph.D. (MIT). Applied probability.

†Harry Gingold, D.Sc. (Israel Inst. Tech.). Differential equations, Perturbation methods, Asymptotic methods.

†Henry W. Gould, M.A. (U. Va.). Combinatorics, Number theory, Special functions.

†Anthony Hilton, Ph.D. (Reading U.). Eberly Professor. Combinatorics, graph theory.

†Caulton L. Irwin, Ph.D. (Emory U.). Associate Director, Energy Research Center. Variational methods, Optimization, Applied mathematics.

†Jin Bai Kim, Ph.D. (VPI & SU). Emeritus. Algebra, Semigroups.

†Michael E. Mays, Ph.D. (Penn. St. U.). Number theory.

†William H. Simons, Ph.D. (Carnegie-Mellon U.). Analysis, Differential equations, Applied mathematics.

Associate Professors

†Krzysztof Ciesielski, Ph.D. (Warsaw U.). Analysis, Topology.

†Gary Ganster, Ph.D. (RPI). Applied mathematics, Fluid mechanics.

†Harumi Hattori, Ph.D. (RPI). Differential equations, Continuum mechanics, Numerical analysis.

†Andrzej Karwowski, Ph.D. (Rutgers U.). Continuum mechanics.

†Hong-Jian Lai, Ph.D. (Wayne St. U.). Combinatorics, Graph theory.

†Dening Li, Ph.D. (Fudan U.). Partial differential equations.

†James E. Miller, Ph.D. (U. Ky.). Complex analysis.

†James L. Moseley, Ph.D. (Purdue U.). Partial differential equations.

†Joseph Wilder, Ph.D. (RPI). Applied mathematics.

†Cun-Quan Zhang, Ph.D. (Simon Fraser U.). Combinatorics, Graph theory.

Assistant Professors

†Weifu Fang, Ph.D. (Claremont). Applied Mathematics.

†John Goldwasser, Ph.D. (U. Wisc.). Combinatorics, Linear algebra.

†Jerzy Wojciechowski, Ph.D. (Cambridge U.). Combinatorics, Graph theory.

Philosophy

Professors

*Ralph W. Clark, Ph.D. (U. Colo.). Ethics, Business ethics, Metaphysics.

*Theodore M. Drange, Ph.D. (Cornell U.). Philosophy of religion, Epistemology.

*Mark R. Wicclair, Ph.D. (Columbia U.). Philosophy of law, Medical ethics, Ethics.

Associate Professors

*Richard A. Montgomery, Ph.D. (U. Ill.-Chicago). Chairperson. Philosophy of mind/cognitive science, Philosophy of science.

*Daniel Shapiro, Ph.D. (U. Minn.). Social and political philosophy, Ethics, Philosophy of law.

Assistant Professor

*Ned Markosian, Ph.D. (U. Mass-Amherst.). Metaphysics, Philosophy of language, History of philosophy.

Physics

Professors

Atam P. Arya, Ph.D. (Penn. St. U.). Nuclear spectroscopy, Physics education.

*Bernard R. Cooper, Ph.D. (U. Calif.). Benedum Professor of Physics. Condensed matter and materials theory.

*Martin V. Ferer, Ph.D. (U. Ill.). Phase transitions and critical phenomena, Theory.

*Larry Halliburton, Ph.D. (U. Mo.). Chairperson. Solid state physics, Experiment.

Richard T. Kouzes, Ph.D. (Princeton U.). Nuclear physics, Physics education.

*John E. Littleton, Ph.D. (U. Rochester). Astrophysics.

*Carl A. Rotter, Ph.D. (Case W. Res. U.). Neutron scattering, Physics education.

*Mohindar S. Seehra, Ph.D. (U. Rochester). Eberly Professor. Magnetic, electronic, optical properties of solids, Experiment.

*Richard P. Treat, Ph.D. (U. Calif. Riverside). Mathematical physics.

Associate Professors

*Wathiq Abdul-Razaq, Ph.D. (U. Illinois-Chicago Circle). Solid state physics, Experiment.

*Nancy C. Giles, Ph.D. (N.C. St. U.). Optical properties of semiconductors, Experiment.

*Boyd Edwards, Ph.D. (Stanford U.). Fluid dynamics, Combustion processes, Percolation theory.

*Mark E. Koepke, Ph.D. (U. Maryland). Plasma physics, Experiment.

*H. Arthur Weldon, Ph.D. (MIT). Particle physics, Quantum fields, Theory.

Assistant Professors

David Lederman, Ph.D. (U. Calif.-Santa Barbara). Condensed matter physics, Experiment.

*Thomas H. Myers, Ph.D. (N.C. St. U.). MBE growth of II-VI semiconductors.

*Leonardo Golubovic, Ph.D. (Belgrade U.). Condensed matter theory and statistical physics.

Earl E. Scime, Ph.D. (U. Wisc.-Madison). Plasma physics, Experiment.

Political Science

Professors

*Robert E. DiClerico, Ph.D. (Ind. U.). Director of Undergraduate Studies. American politics, Presidential politics, Political parties, Electoral behavior, Public policy (Agenda setting).

*Robert Dilger, Ph.D. (Brandeis U.). Director, Institute for Public Affairs. Intergovernmental relations, State and local government, Congress.

*Joe D. Hagan, Ph.D. (U. Ky.). International relations and world politics, Foreign policy analysis.

*Hong N. Kim, Ph.D. (Georgetown U.). Comparative politics (Asia), Comparative public policy.

*Donley Studlar, Ph.D. (Ind. U.). Eberly Distinguished Professor. British politics, Comparative politics (European and English-speaking regimes), Gender and ethnic politics.

*James B. Whisker, Ph.D. (U. Maryland). Political thought and philosophy, American politics.

*Rodger D. Yeager, Ph.D. (Syracuse U.). Comparative politics, Africa, Political development.

Associate Professors

*Richard A. Brisbin, Jr., Ph.D. (Johns Hopkins U.). Public law and judicial politics, Public policy (Criminal justice and regulation).

*Robert D. Duval, Ph.D. (Fla. St. U.). Methodology, International politics and policy, Public policy (Energy, environmental, foreign).

†Allan H. Hammock, Ph.D. (U. Va.). Chairperson. American government, Public policy (Civil rights, health care).

†Susan Hunter, Ph.D. (Ohio St. U.). Public policy (environment, policy design, ethics), Contemporary political theory.

Assistant Professors

†Neil Berch, Ph.D. (U. Wash.). Public policy (political economy), American politics (state and local).

*Paul Hoyt, M.A. (Ohio St. U.). Comparative politics (Middle East), International relations, U.S. Foreign Policy.

†John Kilwein, Ph.D. (Ohio St. U.). Public law, Judicial politics, Public policy, Public administration.

†Kevin Leyden, Ph.D. (U. Iowa). Congress, Political behavior, Interest groups, Research methods.

†Christopher Z. Mooney, Ph.D. (U. Wisc.). State politics, Research methods, Legislative politics.

†Jeffrey S. Worsham, Ph.D. (U. Wisc.). Public policy (regulation, social welfare), Bureaucratic politics and public administration.

Psychology

Professors

†Philip N. Chase, Ph.D. (U. Mass.). Chairperson. Verbal behavior, Concept learning, Individualized instruction, Organizational behavior management.

†Stanley H. Cohen, Ph.D. (Mich. St. U.). Quantitative methods, Applications of computers in behavioral sciences, Multivariate analysis. Survey and evaluation research.

*Philip E. Comer, Ph.D. (WVU). Director, Carruth Center for Counseling and Psychological Services. Adjustment and developmental aspects of college life, Counseling and psychotherapy, Psychopathology, Diagnostic methods.

†Barry A. Edelstein, Ph.D. (Memphis St. U.). Social competence, Behavioral assessment, Behavior therapy.

†Georg H. Eifert, Ph.D. (U. Frankfurt, Germany). Eberly Distinguished Professor. Models and treatments of anxiety disorders, Conceptual advances in behavior therapy, Clinical applications of classical conditioning principles.

†William J. Fremouw, Ph.D. (U. Mass.). Cognitive-behavioral therapy, Eating disorders.

†Robert P. Hawkins, Ph.D. (U. Pitt.). Behavior analysis of child behavior, Behavioral assessment, Child treatment programs.

Daniel E. Hursh, Ph.D. (U. Kansas). Educational psychology, Personalized systems of instruction, Language evaluation.

†Kennon A. Lattal, Ph.D. (U. Ala.). Centennial Professor. Experimental analysis of behavior, Behavior theory and philosophy, History of psychology.

Joseph Panepinto, Ph.D. (WVU). Community psychology, Program development and evaluation.

†Michael Perone, Ph.D. (U. Wisc.-Milwaukee). Associate Chairperson. Basic processes in the operant behavior of humans and animals, Research methodology, Laboratory application of microcomputers, Radical behaviorism.

†Hayne W. Reese, Ph.D. (U. Iowa). Centennial Professor. Cognitive development across the lifespan, Lifespan research methodology, Philosophical analysis.

†Richard J. Seime, Ph.D. (U. Minn.). Adult behavior therapy and assessment, Eating disorders, Mood disorders.

James N. Shafer, Ph.D. (Ohio St. U.). Emeritus. Behavior analysis.

R. T. Walls, Ph.D. (Penn State U.). Educational psychology, Human learning, Vocational Rehabilitation.

Associate Professors

†Andrew S. Bradlyn, Ph.D. (U. Miss.). Pediatric behavioral medicine, Child behavior therapy and assessment.

James Capage, Ph.D. (Ohio U.). Clinical assessment, Psychotherapy, Abnormal behavior.

†Virginia L. Goetsch, Ph.D. (U. Ga.). Behavioral medicine, Psychophysiology of stress, Anxiety disorders.

†Irving J. Goodman, Ph.D. (U. Rochester). Neural mechanisms of behavior, Psychopharmacology, Behavioral neuroscience.

†Carol V. Harris, Ph.D. (U. Fla.). Child and adolescent behavior therapy, Adolescent substance abuse, Pediatric behavioral medicine.

†Katherine Hildebrandt Karraker, Ph.D. (Mich. St. U.). Infant social development, Physical appearance effects on development, Parent-infant relations.

- *Kevin Larkin, Ph.D. (U. Pitt). Behavioral assessment and treatment of anxiety-related disorders, Relationship between cardiovascular reactivity and cardiovascular disease.
 Alice Darnell Lattal, Ph.D. (WVU). Organizational behavior management.
 *John C. Linton, Ph.D. (Kent U.). Behavioral medical psychology, Crisis intervention.
 Daniel W. McNeil, Ph.D. (U. Ala.). Director of Clinical Training. Experimental psychopathology, Fear, Anxiety, Phobia.
 †Vernon Odom, Ph.D. (U. N.C.). Abnormal and normal visual development.
 †B. Kent Parker, Ph.D. (U. Utah). Conditioning and learning, Animal cognition, Stimulus control and memory, Research design and statistics.

Assistant Professors

- Dennis Becotte, Ph.D. (U. Pitt.). Federal corrections.
 Martin Boone, Ph.D. (Okla. St. U.). Behavioral medicine, Clinical neuropsychology.
 David Brunetti, Ph.D. (Okla. St. U.). Individual and group psychotherapy, Psychological assessment, Forensic evaluation
 Jeannie Sperry Clark, Ph.D. (Ohio U.). Factors associated with successful placement and improvement of psychiatric inpatients, Ethical decisions in psychotherapy.
 Bruce Corsino, Ph.D. (Fla. Inst. Tech.). Ethics and psychology, Informed consent, End-of-life treatment issue.
 John Crosbie, Ph.D. (Flinders U. South Australia). Human operant behavior, Programmed instruction, Statistical analysis of single-subject data.
 Lydia Eifert-McLarnon, Ph.D. (Concordia U.). Illness behavior, Chronic and acute pain, Women's health issues.
 Scott H. Friedman, Psy.D. (Hahnemann U.). Director of Training, Carruth Center for Counseling and Psychological Services. Psychotherapy, Assessment, Dissociative disorders, Brief psychotherapy.
 Jeffrey Hammond, Ph.D. (U.S. International U.). Supervision, Forensic psychology, Psychotherapy.
 †Jennifer Haut, Ph.D. (U. North Dakota). Behavioral medicine.
 †Marc Haut, Ph.D., (U. North Dakota). Behavioral medicine.
 Alfred Kasproicz, Ph.D. (U. Pitt.). Behavioral medicine, Psychophysiology.
 Donald K. Kincaid, Ed.D. (WVU.). Developmental disabilities, Positive behavior support, Personal futures planning.
 Jan M. Kouzes, Ed.D. (Indiana U.). Psychotherapy with individuals, couples, families, groups.
 Cheryl B. McNeil, Ph.D. (U. Fla.). Disruptive behavior disorders of children, Assessment, Parent-child interactions.
 †Tracy L. Morris, Ph.D. (U. Miss.). Peer relationships and social anxiety in children, Parent-child interactions, Internalizing disorders in children.
 †Anne Watson O'Reilly, Ph.D. (U. Mich.). Cognitive development in young children, Representational ability, Symbolic thought.
 †David W. Schaal, Ph.D. (U. Fla.). Behavioral pharmacology.
 †Joseph R. Scotti, Ph.D. (SUNY-Binghamton). Mental retardation and developmental disabilities, AIDS prevention, Behavioral systems, Standards of practice, Treatment of survivors of trauma.
 Brian H. Sharp, Ph.D. (WVU). Clinical neuropsychology and rehabilitation, Traumatic brain injury.
 Julie Smith, Ph.D. (WVU). Organizational performance systems, Innovation and creativity, Training systems.
 Nina Spadaro, Ed.D. (WVU). Family and marriage maintenance during incarceration, Group therapy.
 Thomas J. Spencer, Ph.D. (WVU). Organizational behavior management.
 †Raymond J. Shaw, Ph.D. (U. Toronto). Memory and cognition, Alterations due to aging.
 Mark D. Weist, Ph.D. (Va. Poly. Inst. and St. U.). School-based mental health services.
 Leslie Wilk, Ph.D. (W. Mich. U.). Organizational behavior management, performance management and leadership.
 Christina Sara Wilson, Ph.D. (Wayne St. U.). Clinical neuropsychology, Dementia, Head Injury.

Public Administration Professors

- Herman Mertins, Jr., Ph.D. (Syracuse U.). Public finance, Planning, Public management.
 †Gerald M. Pops, Ph.D. (Syracuse U.), J.D. (U. Calif.). Personnel, Public law.
 †David G. Williams, Ph.D. (SUNY Albany) Chairperson. Public organization, Management.

Associate Professors

[†]Kenneth A. Klase, D.P.A. (U. Ga.). Public budgeting and finance, Public policy analysis, Planning.

Assistant Professors

Nancy Adams, M.S.N. (U. Md.). Healthcare administration.

L. Christopher Plein, Ph.D. (U. Mo.). Public policy, Legal and Political foundations.

Soo Geun Song, D.P.A. (U. Ga.). Research methods, Public budgeting and finance, Policy analysis.

Religious Studies

Professor

[†]Manfred O. Meitzen, Ph.D. (Harvard U.). Director. Contemporary theology, New Testament studies, Ethics, Psychiatry and religion.

Sociology and Anthropology

Professors

[†]Ronald C. Althouse, Ph.D. (U. Minn.). Chairperson, Sociology. Theory, Work, Occupational safety and health.

[†]Richard A. Ball, Ph.D. (Ohio St. U.). Sociology. Deviant behavior, Criminology, Social psychology.

[†]Jerold M. Starr, Ph.D. (Brandeis U.). Sociology. Life course, Social movements, Sociology of knowledge.

Associate Professors

[†]Lawrence T. Nichols, Ph.D. (Boston C.). Sociology. Criminology, Sociology of business, Theory, Qualitative methods.

*Ann L. Paterson, Ph.D. (Mich. St. U.). Sociology. Education, Sex roles, Socialization.

[†]Patricia Rice, M.A. (Ohio St.). Anthropology. Prehistoric art, Physical archaeology.

[†]Kenyon R. Stebbins, Ph.D. (Mich. St. U.). Anthropology. Medical anthropology, Latin America, Political economy of history.

Assistant Professors

[†]Bruce Keith, Ph.D. (U. Neb.). Sociology. Stratification, Occupations and the professions, Methodology.

[†]Sally W. Maggard, Ph.D. (U. Ky.). Sociology. Appalachian studies, Gender, Work, Social change.

Melissa Latimer, Ph.D. (U. Ky.). Sociology. Stratification and inequality, Poverty, Labor market analysis, Work and occupations, Gender and race issues, Sociology of sports, Violence against women.

F. Carson Mencken, Ph.D. (LSU). Sociology. Stratification, Work and labor markets, Industrial, Job matching, Networks.

Gretchen Stiers, Ph.D. (U. of Mass.). Sociology. Medical sociology, Health, Aging, Family, Gender relations.

Statistics and Computer Science

Professors

[†]John M. Atkins, Ph.D. (U. Pitt.). Computer Science. Design of database management systems, Analysis of algorithms, Mathematics of computation.

*Donald F. Butcher, Ph.D. (Iowa St. U.). Statistics. Design and analysis of experiments, Monte Carlo simulation, Regression analysis.

*Erdogan Gunel, Ph.D. (SUNY-Buffalo). Statistics. Bayesian inference, Categorical data analysis, Biometry.

[†]E. James Harnier, Jr., Ph.D. (Cornell U.). Statistics. Robust estimation, Statistical computation, Modeling observational studies.

[†]D. Michael Henry, Ph.D. (TCU). Computer Science. Databases, Cryptography, Neural networks.

*Franz X. Hiergeist, Ph.D. (U. Pitt.). Associate Chairperson. Computer Science, Mathematics of computation, Computer design.

*Wayne A. Muth, Ph.D. (Iowa St. U.). Chairperson. Computer science, Simulation, Mathematical modeling, Computer performance.

[†]Y. V. Reddy, Ph.D. (WVU). Computer Science. Artificial intelligence, Knowledge based simulation, Computer graphics.

[†]William V. Thayne, Ph.D. (U. Ill.). Statistics. Statistical genetics, Regression analysis.

*George E. Trapp, Ph.D. (Carnegie Mellon U.). Computer Science. Numerical analysis, Mathematical programming, Network models.

*Stanley Wearden, Ph.D. (Cornell U.). Statistics. Biometrics, Statistical genetics, Population biology.

Associate Professors

*Daniel M. Chilko, M.S. (Rutgers U.). Statistics. Statistical computing, Computer graphics.

William H. Dodrill, M.S. (Columbia U.). Computer Science. Microcomputer applications, Computers in medicine.

*Gerald R. Hobbs, Jr., Ph.D. (Kans. St. U.). Statistics. Nonparametric statistics, Regression analysis.

*James D. Mooney, Ph.D. (Ohio St. U.). Computer Science. Operating systems, Text processing, Computer architecture.

*Frances L. Van Scoy, Ph.D. (U. Va.). Computer Science. Programming languages and compilers, Software development environments, Parallel processing.

Assistant Professors

*Magdalena Niewiadomska - Bugaj, Ph.D. (Adam Mickiewicz U., Poznan, Pol.). Statistics. Discriminant analysis, Statistical expert systems, Statistical computing.

*John R. Callahan, Ph.D. (Maryland). Computer Science. Development of programming languages, Tools for distributed systems, Software engineering.

*Srinivas Kankanahalli, Ph.D. (New Mexico State). Computer Science. Artificial Intelligence, Connectionism/neural networks, Parallel processing.

*Raghu R. Karinithi, Ph.D. (Maryland). Computer Science. Solid modelling, Automatic feature extraction, AI process planning.

*William F. Klostermeyer, Ph.D. (U. Florida). Computer Science. Design and analysis of algorithms, Operating systems, Distributed algorithms and distributed systems.

*Murali Sitaraman, Ph.D. (Ohio State). Computer Science. Software engineering, Data structures, Software reuse.

Adjunct Professors

William N. Anderson, Ph.D. (Carnegie Mellon U.). Computer Science. Numerical analysis, Mathematical programming, Electrical networks.

Thomas J. O'Brien, Ph.D. (U. Wisc.). Computer Science. Numerical analysis, Mathematical modelling, Numerical simulation.

Tuncer J. Oren, Ph.D. (U. Ariz.). Computer Science. Artificial intelligence, Software engineering, Simulation.

Bernard P. Zeigler, Ph.D. (U. Ariz.). Computer Science. Artificial intelligence, Systems modelling and simulation, Distributed simulation architectures.

Adjunct Associate Professors

Laurance D. Eisenhart, Ph.D. (Carnegie Mellon U.). Computer Science. Numerical analysis, Scientific systems development.

Mark S. Fox, Ph.D. (Carnegie Mellon U.). Computer Science. Knowledge based simulation, Artificial intelligence, Knowledge representation.

Thomas D. Morley, Ph.D. (Carnegie Mellon U.). Computer Science. Electrical networks, Functional analysis, Combinatorics.

Adjunct Assistant Professors

Michael E. Attfield, Ph.D. (WVU). Statistics. Design and analysis of experiments.

Rodolphe Nassif, Ph.D. (Inst. Natl. Poly., France). Computer Science. Information systems, Distributed database management systems.

Martin R. Petersen, Ph.D. (N.C. St.). Statistics. Design and analysis.

Women's Studies

Professor

*Judith G. Stitzel, Ph.D. (U. Minn.). Women's studies, Feminist pedagogy, Creative writing.

Associate Professor

Helen M. Bannan, Ph.D. (Syracuse U.). Director. Women's Studies, American Indian history.

Visiting Assistant Professor.

Barbara Scott Winkler, Ph.D. (U. Mich.). Women's studies, Feminist pedagogy, History of sexuality.

Biology

Keith Garbutt, Chairperson of the Department

200 Brooks Hall

Degrees Offered: Master of Science, Doctor of Philosophy

The Department of Biology offers graduate studies leading to the degrees of doctor of philosophy and master of science. The doctor of philosophy degree is offered in the area of cellular and molecular biology and in the area of environmental plant biology, with research concentration in the areas of gene regulation and transcriptional control during development; genetic analysis of circadian rhythms in *Drosophila*; positional effect on gene expression in *Drosophila*; cellular and molecular bases of regulation of cell proliferation; pheromonal communication; bone cell differentiation; endocrinology of reproduction; molecular biology of aging; population and ecological genetics of plants; environmental plant stress physiology; and physiological, population, community and ecosystem ecology with an emphasis on global climate change, regional environmental issues and conservation of biodiversity. The master of science provides specialization in animal behavior as well as in cellular and molecular biology and environmental plant biology as listed above. Each degree requires completion of an original research project which represents the principal theme about which the graduate program is constructed. Students may work toward an advanced degree only with the approval of the department.

Master of Science

Prerequisites and Requirements Applicants for the master of science program in biology must show at the minimum the equivalent of a bachelor's degree from an accredited institution, an undergraduate grade-point average of 3.0, a 50th percentile ranking for the verbal, quantitative, and analytical sections of the Graduate Record Examination; an adequate science background, which normally includes one year of physics and two years of chemistry; and a sufficient knowledge in biology as reflected in scores normally greater than the 50th percentile on all three sections of the GRE subject test in Biology. Applicants are requested to submit an essay describing past research experience and expectations for career goals. Three letters of recommendation from individuals familiar with the applicant's academic performance are required as well as official transcripts from all colleges or universities attended. The Department of Biology's Graduate Committee reviews the applicant's records and makes the decision to admit or reject the applicant.

The WVU general requirements for the master of science are outlined elsewhere in the graduate catalog. Students in the biology M.S. program may apply up to six hours of research credit toward the 30-hour requirement; the remaining 24 hours of credit must be earned in graduate courses which reflect a diversified exposure to biology. The establishment of an advisory committee and the generation of a program of study are explained in detail in the department's *Graduate Student Handbook*. A final oral examination is administered by the advisory committee after the program of study has been completed and the thesis has been submitted.

Doctor of Philosophy

Program The program for the degree of doctor of philosophy concentrating in cellular and molecular biology, or in environmental plant biology, reflects a flexible, research-oriented approach geared to develop the interests, capabilities, and potentials of mature students. Applicants must have met all the entrance requirements listed above for the master of science program. Acceptance into the Ph.D. program is by vote of the Graduate Committee of the Department of Biology. This committee ensures that all entrance requirements are met or that provisions have been made to remedy the deficiencies, and that facilities and personnel are adequate to support the program to a successful conclusion.

Each student admitted to the Ph.D. program works under the close supervision of a faculty research advisor and an advisory committee; details on the composition and establishment of an advisory committee are available in the *Graduate Student Handbook*. Students must have a program of study formulated and approved within 12 months of entering the Ph.D. program; all deficiencies must have been removed earlier. Significant deviations from an established program of study require approval from the advisory committee and the graduate committee.

Examinations and Dissertation Proposal The advisory committee is responsible for overseeing the progress of the student and for administering and judging performance in the required examinations; it ensures that all Department of Biology, College of Arts and Sciences, and University requirements are met during the course of the student's program of study. The program of study outlines the course work to be taken in support of the proposed research.

Students must successfully complete a Preliminary Exam and Proposal Exam before being promoted to candidacy for the Ph.D. The Preliminary Exam is given by the end of the fourth semester in residence and consists of two parts, a Written Exam and an Oral Exam. The Proposal Exam is taken by the end of the fifth semester in residence and consists of a written dissertation research proposal, which is also orally presented before the department.

Candidacy Successful passage of the Preliminary and Proposal examinations leads to promotion to candidacy, wherein the student may concentrate fully upon the dissertation research and prepare for the final examination. The final examination consists of the submission of a completed and acceptable written dissertation and an oral dissertation defense. A formal departmental seminar covering the dissertation research must be presented before graduation.

Biology (BIOL)

201. *History of Biology*. I. 3 hr. PR: BIOL 1, 3 and 2, 4 or equiv. History of development of biological knowledge, with philosophical and social backgrounds.

209. *Topics and Problems in Biology*. I, II, S. 1-4 hr. (May be repeated for max. of 6 hr.) PR: Permit required. Topics and problems in contemporary biology. All topics or problems must be selected in consultation with the instructor.

211. *Advanced Cellular/Molecular Biology*. II. 3 hr. PR: BIOL 19 or consent. Advanced study of fundamental cellular activities and their underlying molecular processes.

212. *Advanced Cellular/Molecular Biology—Laboratory*. II. 1 hr. PR or Conc.: BIOL 211 or consent. Experimental approaches to the study of cellular systems. 1 hr. lab.

213. *Introduction to Virology*. 3 hr. PR: BIOL 19 or consent. Survey of viruses; their modes of replication; contributions made to molecular biology; significance of viral disease in agriculture and medicine, and contemporary use of viruses in biotechnology. 3 hr. lec.

214. *Molecular Basis of Cellular Growth*. I. 3 hr. PR: BIOL 19 or consent. Study of the integration of molecular events as they regulate the growth and division of cells. Topics include: polypeptide growth factors as cell effectors, the eukaryotic cell cycle, and the cancer cell as a model system.

216. *Cell and Molecular Biology Methods*. I. 3 hr. PR: BIOL 19 or consent. Introduction to the theory and application of basic analytical tools used in molecular biology. Selected

topics included are: hydrodynamic methods, chromatography, electrophoresis, and general laboratory methods.

219. *Introduction to Recombinant DNA Technology*. I. 4 hr. PR: BIOL 19 or consent. An introductory course covering the basic principles and techniques of recombinant DNA technology. Includes molecular cloning, isolation of plasmid DNA, agarose/acrylamide gel electrophoresis, restriction enzyme mapping, nucleic acid hybridization, and DNA sequencing.

231. *Animal Behavior*. I. 4 hr. PR: BIOL 1, 3 and 2, 4 or 15, PSYC 1, or consent. Introduction to animal behavior (ethology) emphasizing the biological bases and evolution of individual and social behaviors; laboratory includes independent investigation of behavioral phenomena.

232. *Physiological Psychology*. I. 3 hr. PR: 9 hr. psychology, behavior, physiology, or graduate standing. Introduction to physiological mechanisms and the neural basis of behavior. (Also listed as PSYC 232.)

233. *Behavioral Ecology*. I. 3 hr. PR: BIOL 21 or consent. Consideration of the influences of environmental factors on the short- and long-term regulation, control, and evolution of the behaviors of animals.

234. *Physiology of Animal Behavior*. II. 3 hr. PR: BIOL 231 or consent. Explores the way behavior is controlled in a wide variety of animals so that commonalities and varieties of neural and endocrine mechanisms may be better understood.

235. *Primate Behavior*. II. 3 hr. PR: BIOL 1, 3 and 2, 4 or 15 or consent. Primates as they exist in their natural habitats, as they suggest clues to human behavior and the evolution of behavior. Case studies and comparative primate behavior of prosimians to monkeys, to apes, to human hunters and gatherers. (Also listed as SOCA 257.)

240. *Methods in Ecology and Biogeochemistry*. II. 3 hr. PR: BIOL 21 or consent. Introduction to the theory and application of basic analytical tools used in ecology and biogeochemistry. Topics include sampling of terrestrial and aquatic organisms and their environment, and chemical analyses of biological materials.

242. *Acid Precipitation on Aquatic Ecosystems*. II. 3 hr. PR: BIOL 1, 3 and 2, 4, or BIOL 15 or equiv. Acid precipitation and its effects on freshwater ecosystems including all biological communities as well as overall effects on system functions and studies to assess the recovery from whole lake treatments.

243. *Plant Ecology*. I. 4 hr. PR: BIOL 21, or consent. Environmental and ecological relationships of plants.

246. *Limnology*. I. 4 hr. PR: BIOL 1, 3 and 2, 4, or 21, or consent. Physical, chemical, and biological characteristics of inland waters with an introduction to the principles of biological productivity.

247. *Aquaculture*. I. 3 hr. PR: BIOL 1, 3 and 2, 4, or 15, or consent. An introduction to the farming and husbandry of freshwater and marine organisms. Overnight field trips are voluntary. (Offered in fall of odd years.)

250. *Aquatic Seed Plants*. I. 3 hr. PR: BIOL 1, 3 and 2, 4, or 21, or consent. Classification, ecology, and economic importance of aquatic seed plants.
251. *Principles of Evolution*. I. 3 hr. PR: BIOL 21, or consent. Introduction to the study of evolution.
252. *Flora of West Virginia*. II. 3 hr. PR: BIOL 1, 3 and 2, 4, or consent. Consideration of the native plant life of the state.
253. *Structure of Vascular Plants*. II. 4 hr. PR: BIOL 1, 3 and 2, 4, or 21, or PLSC 52, or consent. Development and evolution of vegetative and reproductive structures of vascular plants.
254. *Plant Geography*. II. 3 hr. PR: BIOL 1, 3 and 2, 4, or 15, or consent. Study of plant groupings and worldwide distribution of plants.
255. *Invertebrate Zoology*. II. 4 hr. PR: BIOL 1, 3 and 2, 4, or 21. Advanced study of animals without backbones.
257. *Ichthyology*. II. 3 hr. PR: BIOL 1, 3 and 2, 4, or 21, or consent. Internal and external structure of fishes, their systematic and ecological relationships, and their distribution in time and space. (Dissection kit required.)
259. *General Parasitology*. II. 4 hr. PR: BIOL 1, 3 and 2, 4, or 21, or equiv. Introduction to the biology of parasites. (Dissection kit required.) (Also listed as MBIO 224.)
260. *Plant Development*. I. 4 hr. PR: BIOL 15, 17, 19, and 21, and organic chemistry or biochemistry, or consent. Experimental studies of plant growth and development.
261. *Comparative Anatomy*. I. 4 hr. PR: BIOL 15, 17, 19, and 21, or consent. A functional and evolutionary study of vertebrate structure. (Dissection kit required.)
262. *Vertebrate Embryology*. II. 4 hr. PR: BIOL 15, 17, 19, and 21, or consent. An experimental and descriptive analysis of vertebrate development.
263. *Vertebrate Microanatomy*. II. 5 hr. PR: BIOL 15, 17, 19, and 21, or consent. Structural and functional approach to the study of tissues and organs of vertebrates.
268. *Physiology of the Endocrines*. I. 3 hr. PR: BIOL 21 or consent. Regulation of the organs of internal secretions, and mechanisms of action of the hormones produced.
269. *Physiology of the Endocrines—Laboratory*. I. 1 hr. PR or Conc.: BIOL 268. Experimental techniques used in study of the endocrine system.
270. *General Animal Physiology*. I. 3 hr. PR: BIOL 15, 17, 19, and 21, or consent. In-depth, current treatment of physiological principles which operate at various levels of biological organization in animals of diverse taxonomic relationships. Understanding is developed from background lectures and student analysis in discussion sessions of research literature.

271. *General Animal Physiology—Laboratory*. I. 1 hr. PR or Conc.: BIOL 270. After learning basic techniques, students are provided the opportunity to design, execute, and report on an independent research project in physiology.

309. *Topics and Problems in Biology*. I, II, S. 1-4 hr. PR: Consent. Topics and problems in contemporary biology, to be selected in consultation with instructor.

311. *Biology Seminar*. I, II. 1 hr. Discussions and presentations of general interest to biologists.

314. *Molecular Cell Biology*. II. 3 hr. PR: Consent. An advanced course presenting contemporary methodologies and their application to the study of problems in cellular organization, molecular genetics, and developmental biology. Introduction to the research literature is stressed.

315. *Molecular Basis of Virology*. I. 3 hr. PR: BIOL 19 or equiv., or consent. Lectures on bacterial, animal, and plant viruses; their structure, replication, and interaction with host cells. Discussion of the contributions virology has made to the understanding of molecular mechanisms in biology.

320. *Molecular Biology of the Gene*. 3 hr. PR: BIOL 19 or consent. Comprehensive survey of basic principles, theories, and techniques of molecular biology, including structure/function of nucleic acids, DNA replication, transcription, translation, recombination, gene regulation, and function. 3 hr. lec.

340. *Ecosystem Dynamics*. I. 3 hr. PR: BIOL 21 or equiv. Studies of modern approaches to ecosystem analysis. Emphasis will be on energy and material transfers. Approach will be holistic.

345. *Fisheries Science*. II. 4 hr. PR: BIOL 257 or equiv., or consent. Population dynamics in relation to principles and techniques of fish management. (Offered in spring of even years.)

355. *Advanced Plant Systematics 1*. II. 3 hr. PR: BIOL 151 or equiv. Taxonomy of pteridophytes, gymnosperms, and monocotyledons.

356. *Advanced Plant Systematics 2*. II. 3 hr. PR: BIOL 151 or equiv. Taxonomy of dicotyledons.

362. *Developmental Biology*. I. 3 hr. PR: BIOL 262 or equiv., organic chemistry or biochemistry, or consent. The molecular and cellular basis of differentiation and morphogenesis. (Offered in fall of odd years.)

364. *Advanced Plant Physiology*. I, II. 3 hr. PR: BIOL 168 or equiv., organic chemistry, general physics, and consent. Advanced studies of plant processes including recent advances in the field. I. Second Semester, odd-numbered years—Water relations and mineral nutrition and translocation. II. First Semester, odd-numbered years—Plant growth and development. III. Second Semester, even-numbered years—Environmental physiology.

375. *Fundamentals of Gerontology*. II. 3 hr.. PR: MDS 50 or consent. An advanced multidisciplinary examination of current research in biological, psychological, and sociological issues of human aging and the ways in which these impinge on the individual to create both problems and new opportunities. (Also listed as PSYC 375.)

497. *Research*. I, II, S. 1-15 hr.

Chemistry

Paul W. Jagodzinski, Chairperson of the Department

222 Clark Hall or 357 Chemistry Research Laboratory

Degrees Offered: Master of Science, Doctor of Philosophy

The Department of Chemistry offers graduate studies leading to the degrees of master of science and doctor of philosophy with research concentration in the areas of analytical, inorganic, organic, physical, and theoretical chemistry. The master of science and doctor of philosophy degrees require completion of a research project, which represents the principal component of the graduate program.

Prerequisites

Applicants for graduate studies in chemistry must have a bachelor's degree as a minimum requirement. Applicants must have a major or concentration in chemistry and an appropriate background in physics and mathematics. All entering graduate students in chemistry are required to take departmental guidance examinations in the major areas of chemistry. These examinations, at the undergraduate level, are administered before registration and serve to guide the faculty in recommending a course program for the beginning graduate student. Deficiencies revealed by the departmental guidance examinations need to be corrected in a manner prescribed by the faculty. All graduate students pursuing M.S. and Ph.D. degrees in chemistry are required to teach in the instructional laboratories for a minimum of two semesters.

Thesis/Credits

The WVU general requirements for the master of science degree are outlined elsewhere in this catalog. Graduate students in the M.S. program in chemistry are required to submit a research thesis. They may apply up to six hours of research credit toward the 30-hour requirement. The remaining 24 hours of credit must be earned in the basic graduate courses which reflect a diversified exposure to chemistry; no more than nine hours of 200-level chemistry courses may be included; no more than 10 hours may be elected outside the department; and course work taken at the 300 to 400-level must include at least three, three credit-hour courses distributed in two of the three areas of chemistry outside the student's major area of research. Students are required to enroll in the departmental seminar program and are expected to attend special lectures and seminars offered by visiting scientists. A final oral examination is administered after completion and submission of the thesis.

Doctor of Philosophy

The program for the degree of doctor of philosophy reflects a flexible, research-oriented approach geared to develop the interests, capability, and potential of students. A program of courses is recommended to suit individual needs based on background and ability. These courses are classified as basic graduate courses which present the

essentials of a given discipline on an advanced level, and specialized graduate courses that take one to the frontiers in a specific area of research. The course offerings are designed to provide guidelines from which students can launch their independent studies in preparation for candidacy examinations. Students are required to enroll in the departmental seminar program and are expected to attend special lectures and seminars offered by visiting scientists.

Graduate students in the Ph.D. program are required to complete satisfactorily a minimum of three courses (three credits each) at the 300-400 course level, offered by the Department of Chemistry and distributed in two areas outside their major area of research. In addition, each major area in chemistry requires students in that area to enroll in basic graduate courses presenting the essentials of that discipline on an advanced level.

Candidacy Candidacy examinations contain written and oral portions. The written examinations are of the cumulative type, and are offered eight times a year. The oral examination is based on a proposition for a research problem not intimately related to the student's own project, or any particular research project being actively pursued at WVU. This proposition is presented in writing to the student's research committee and defended before that group and any other interested faculty members.

Research

Research, which is the major theme of graduate studies, may be initiated as early as the student and faculty feel appropriate for the individual. Normally, a student will begin laboratory work no later than the second semester. Upon successful completion of an original piece of research, the candidate will present results in a Ph.D. dissertation and at the appropriate time defend the work in a final oral examination.

Chemistry (CHEM)

201. *Chemical Literature*. I. 1 hr. PR: CHEM 134 and CHEM 141 or 246. Study of techniques for locating, utilizing, and compiling information needed by the research worker in chemistry. 1 hr. lec.

202. *Selected Topics*. I, II. 1-3 hr. PR: Written consent and 2.0 Chem GPA. Individual instruction under supervision of a faculty member.

210. *Instrumental Analysis*. II. 2 hr. PR: CHEM 115 and Physical Chem. Lectures and demonstrations. Basic electronics, electrochemistry, spectroscopy, mass spectrometry and chromatography. 2 hr. lec., 1 hr. demonstration.

211. *Intermediate Analytical Chem.* I. 3 hr. PR: CHEM 115 and Physical Chem. Concepts underlying modern analytical procedures and their application to the solution of contemporary problems; presented at the intermediate level. 3 hr. lec.

212. *Environmental Chem.* II. 3 hr. PR: CHEM 115, 134, and Physical Chem. Study of the nature, reactions, transport, and fates of chemical species in the environment. 2 hr. lec., 1 hr. demonstration.

213. *Instrumental Analysis Lab*. I. 1 hr. PR: CHEM 210. Practical application of modern instrumental methods to problems in chemical analysis. 3 hr. lab.

214. *Comp Mthds in Analyt Chem*. I. 1 hr. PR: CHEM 210; Conc.: CHEM 213. Instruction in the use of data acquisition and data processing systems in the analytical chemistry laboratory. 3 hr. lab.

222. *Intermediate Inorganic Chem. I.* 3 hr. PR: Physical Chem. Structure, bonding, and reactivity of the compounds of main-group and transition metal elements. Molecular structure, solid state chemistry, ligand field theory, and coordination chemistry. 3 hr. lec.

223. *Inorganic Synthesis Lab. II.* 2 hr. PR: CHEM 222. Application of modern synthetic and spectrochemical methods of analysis to the preparation and characterization of main group, solid-state, transition-metal, and organometallic compounds. Two 3 hr. lab.

235. *Mthds of Structure Dtmn. I.* 4 hr. PR: CHEM 134 and 136. Use of chemical and instrumental methods for the structural elucidation of organic compounds. Techniques covered include: UV, IR, NMR, ESR, and Raman spectroscopies, as well as mass spectrometry. Useful to students in chemistry and related fields of research and applied science. 2 hr. lec., two 3 hr. lab.

237. *Polymer Chem. I.* 3 hr. PR: CHEM 134 and Physical Chem. Methods, mechanisms, and underlying theory of polymerization. Structure and stereochemistry of polymers in relation to chemical, physical, and mechanical properties. 3 hr. lec.

239. *Organic Syntheses. II.* 3 hr. PR: CHEM 134, 136. Modern synthetic methods of organic chemistry. 1 hr. lec., two 3 hr. lab.

241. *Chem Crystallography. II.* 3 hr. PR or Conc.: Physical Chem. or consent. Applications of X-ray diffraction of crystals to the study of crystal and molecular structure. Includes theories of diffraction and crystallographic methods of analysis. 3 hr. lec.

246. *Physical Chem. I.* 3 hr. PR: CHEM 134, MATH 16, and PHYS 12. A first course in physical chemistry. Topics include a study of thermodynamics and chemical equilibria. 3 hr. lec. (Students may not receive credit for CHEM 246 and for CHEM 141.)

247. *Physical Chem Lab. II.* 1 hr. PR: CHEM 18 or 115 and CHEM 246. Experimentation illustrating the principles of physical chemistry and offering experience with chemical instrumentation. 3hr. lab.

248. *Physical Chem. II.* 3 hr. PR: CHEM 246 and MATH 17. Continuation of CHEM 246 Chemical dynamics and the structure of matter. 3 hr. lec. (Students may not receive credit for CHEM 248 and for CHEM 141.)

249. *Physical Chem Lab. I.* 2 hr. PR: CHEM 246, 247, 248. Continuation of CHEM 247. Two 3 hr. lab.

250. *Bonding and Molec Structure. I.* 3 hr. PR: CHEM 248. Introduction to the quantum theory of chemical bonding. Atomic structure, theoretical spectroscopy, predictions of molecular structures and bond properties. 3 hr. lec.

314. *Mass Spec Prncpls & Prctc. II.* 3 hr. PR: CHEM 210. Fundamental principles underlying modern mass spectrometry. Gas phase chemistry related to the formation and fragmentation of ions. The design of instrumental systems for mass spectrometry. Application of mass spectrometric techniques to multidisciplinary problems of current interest. 3 hr. lec.

321. *Organometallic Chemistry.* 3 hr. PR: Graduate standing in chemistry, or consent of the instructor. Structure, syntheses, chemical properties of organometallic compounds; organometallic compounds in organic syntheses and in catalysis. 3 hr. lec.

331. *Adv Organic Chem 1*. I. 3 hr. PR: CHEM 134. Structural concepts, bonding, tautomerism, static and dynamic stereochemistry, mechanistic classifications of reagents, and reactions including some applications. 3 hr. lec.

332. *Adv Organic Chem 2*. II. 3 hr. PR: CHEM 331. Continuation of CHEM 331 with emphasis upon synthetic methods and reaction mechanisms. 3 hr. lec.

341. *Chem Thermodynamics*. I. 3 hr. PR: CHEM 248. Principles of classical and statistical thermodynamics and their application to chemical problems. 3 hr. lec.

411,412. *Sem in Analyt Chem*. I, II. 1 hr. per sem. Current literature and research.

413. *Electrochem and Instrumentn*. I. 3 hr. PR: CHEM 210. Electronic instrumentation applied to study of mass transfer kinetics of electrode reactions, voltammetry, and high-frequency methods. 3 hr. lec.

414. *Analyt Atomic Spectrom*. II. 3 hr. PR: CHEM 213. Theory of atomic spectroscopy relevant to elemental analysis. Considerations in the design and use of modern optical spectrometry systems. 3 hr. lec.

415. *Chemical Separations*. 3 hr. PR: CHEM 115, 133, and Physical Chem. Fundamentals of separative transport and flow transport processes underlying all separation techniques. Empirical coverage of chromatographic and electrophoretic methods for analytical separations. 3 hr. lec.

417, 418. *Adv Topics in Analyt Chem*. I, II. 1-3 hr. per sem. Recent advances and topics of current interest. Lec./discussion.

421, 422. *Sem in Inorganic Chem*. I, II. 1 hr. per sem. Current literature and research.

423. *Phys Mthds in Inorg Chem*. I. 3 hr. PR: CHEM 222. Symmetry, vibrational spectroscopy, theory and applications of NMR and EPR methods, magnetism, optical activity, dynamic processes and fluxional behavior. 3 hr. lec.

424. *Coordination Chem*. II. 3 hr. PR: CHEM 222. Symmetry, hybridization, ligand theory, molecular orbital theory, metal-ligand bonding in coordination complexes and organometallics. 3 hr. lec.

425. *Inorg Rxns and Mchnsms*. I.3 hr. PR: CHEM 222. Inorganic reactions (ligand substitution, aquation, organometallic reactions, electron transfer); kinetics and mechanistic studies. 3 hr. lec.

427, 428. *Adv Topics in Inorg Chem* I, II. 1-3 hr. per sem. Recent advances and topics of current interest. Lec./discussion.

431, 432. *Sem in Organic Chem*. I, II. 1 hr. per sem. Current literature and research.

433. *Physical Organic Chem*. II. 3 hr. PR: CHEM 331. Theoretical considerations of organic molecules, kinetics and other methods used in the study of organic structure and reaction mechanisms, linear free energy relationship and other related topics. 3 hr. lec.

437, 438. *Adv Topics in Org Chem*. I, II. 1-3 hr. per sem. Recent advances and topics of current interest.

441, 442. *Sem in Phys Chem*. I, II. 1 hr. per sem. Current literature and research.

443. *Chem Kinetics*. I. 3 hr. PR: CHEM 248. Theories and applications of kinetics in gaseous state and in solution. 3 hr. lec.

444. *Stat Mechanics*. I or II. 3 hr. PR: CHEM 446. Theory and application of statistical mechanics to chemical systems. 3 hr. lec. (Offered on demand.)

445. *Theoretical Chem 1*. I or II. 3 hr. PR: Differential equations. Theoretical background for quantum mechanics. 3 hr. lec.

446. *Theoretical Chem 2*. I or II. 3 hr. PR: CHEM 445. Theories and applications of quantum mechanics in chemistry. 3 hr. lec. (Offered on demand.)

447. *Molec Spectrosc and Structure*. II. 3 hr. PR: CHEM 250. Advanced applications of spectral methods to the study of molecular structure. 3 hr. lec.

448,449. *Adv Topics in Phys Chem*. I, II. 1-3 hr. per sem. Recent advances and topics of current interest.

491. *Adv Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

492. *Research Sem*. I, II. 1 hr. PR: Graduate student in chemistry. Research seminars by visiting lecturers.

497. *Research*. I, II, S. 1-15 hr.

499. *Grad Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking course work credit but who wish to meet residence requirements, use the University's facilities, and participate in academic and cultural programs.

Communication Studies

James C. McCroskey, Chairperson of the Department

130 Armstrong Hall

Degree Offered: Master of Arts

The Department of Communication Studies offers work leading to the degree of Master of Arts, with a concentration in communication theory and research. Persons who possess a bachelor's degree from an accredited college or university may be admitted to the program. Qualified graduate students from a variety of disciplines are admitted to the program. The master of arts degree program is intended to qualify the student to:

- Assume a variety of professional roles in educational, industrial, governmental, or media institutions.
- Teach the subject matter in high school and/or college.
- Undertake advanced training toward a doctorate in the behavioral/social sciences.

Requirements

In addition to the general WVU requirements, the graduate student in communication studies must meet departmental requirements. These include successful completion of the minimum number of required graduate hours as set forth in Program A, B, or C, below with a grade of B or above in each class and the maintenance of a minimum grade-point average of 3.0.

Classes graded "S" or marked "CR" may not be counted toward a degree.

Program A

Applicants for admission must specify the program they wish to pursue. Program A is open only to full-time resident students. Programs B and C are open to both part-time and full-time students.

All students planning to continue graduate study past the M.A. level are encouraged to enter this program. The following are required:

- At least 36 hours of graduate credit, 30 of which must be in the Department of Communication Studies. A maximum of six hours of thesis credit will be allowed.
- Completion of COMM 401 and 420.
- A thesis.
- An oral examination on the thesis.

Program B

All students planning a professional career in a field other than education are encouraged to enter this program. This is normally a terminal degree program in communication studies. The following are required:

- A minimum of 36 hours of course work with at least 30 hours in the Department of Communication Studies:
- Successful completion of written and oral comprehensive examinations.

The oral examination may be waived with the approval of the student's examination committee and the departmental coordinator of graduate studies.

Students who wish to prepare themselves to be more effective professional communicators but who may not wish to complete program B may obtain a certificate in corporate and organizational communication by completing 15 specified hours in this program. Three courses are required: COMM 491-A *Applied Communication Theory*, COMM 491-B *Nonverbal Communication in the Organizational Environment*, and COMM 376 *Theory and Research in Organizational Communication*. Six hours of electives may be chosen from COMM 370, 373, 374, and 377.

Program C

All students planning a professional career in elementary or secondary education are encouraged to enter this program. This is normally a terminal degree program in communication studies. Students may complete this program through off-campus study, on-campus study, or a combination. The following are required:

- A minimum of 33 hours of course work with at least 27 hours in the Department of Communication Studies including COMM 361, 362, 363, and 491.
- Successful completion of written and oral comprehensive examinations.

The oral examination may be waived with the approval of the student's examination committee and the departmental coordinator of graduate studies.

Communication Studies (COMM)

206. *Advanced Study in Nonverbal Communication*. I, II. 3 hr. PR: COMM 106. Functions of nonverbal communication including status, power, immediacy, relationship development, regulation, turn-taking, leakage and deception, intuition, person perception, and emotional expressions.

221. *Persuasion*. I, II. 3 hr. PR: COMM 11. Theory and research in persuasion, emphasizing a critical understanding and working knowledge of the effects of social communication on attitudes, beliefs, and behavior.

231. *Communication and Symbol Analysis*. I, II. 3 hr. PR: COMM 131. Advanced study of language in communication. Specific attention to conversational analysis.

361. *Communication in the Classroom*. I, II, S. 3 hr. PR: Teaching experience or consent. Role of interpersonal communication in classroom environment, with particular emphasis on communication between students and teachers. Recommended for elementary, secondary, and college teachers in all fields.

362. *Nonverbal Communication in the Classroom*. I, II, S. 3 hr. PR: COMM 361. Impact of nonverbal communication behaviors of students and teachers on teacher-student interaction and student learning. Recommended for elementary, secondary, and college teachers in all fields.

363. *Communication in the Educational Organization*. I, II, S. 3 hr. PR: COMM 361. Problems of communication within educational organizations with emphasis on elements that impact educational change, conflict management, and interpersonal influence. Recommended for elementary, secondary, and college teachers in all fields.

364. *Communication Problems of Children*. I, II, S. 3 hr. PR: COMM 11. (Primarily for elementary and secondary school teachers and language arts supervisors.) Normal maturational development of listening and speaking skills, their relationships to language acquisition, and influence upon achievement.

365. *Media in Communication and Education*. I, II, S. 3 hr. Use of the media in educational and other communication environments with emphasis on communication processes and principles relevant to television and film.

370. *Interpersonal Communication: Theory and Research*. I, II, S. 3 hr. PR: Consent. Survey of the theory and research in dyadic interpersonal communication. Attention to accuracy, coordination, and congruency models with emphasis upon relational communication and intimate communication in interpersonal relationships.

372. *Theory and Research in Mass Communication*. I, II. 3 hr. Mass communication from a consumer's viewpoint. Use of consumer-oriented mass media research also stressed.

373. *Theory and Research in Persuasion*. I, II, S. 3 hr. Various theories and principles of persuasion with emphasis on contemporary research literature.

374. *Intercultural Communication: Theory and Research*. 3 hr. Advanced seminar in communication of various cultures. Special emphasis on research in diffusion of innovations.

375. *Communication Apprehension and Avoidance*. 3 hr. PR: Graduate standing. Theory and research related to individuals' predispositional and situational tendencies to approach or avoid communication. Emphasis on work in the areas of willingness to communicate, communication apprehension, reticence, and shyness.

376. *Theory and Research in Organizational Communication*. I, II. 3 hr. Contemporary research linking communication variables and networks to organizational change, effectiveness, leadership, power, and management practices. Analysis of communication problems within a variety of organizations.

377. *Small Group Theory and Practice*. I, II, S. 3 hr. Specific research areas in interpersonal communication with intensive emphasis on small groups.

391. *Advanced Topics*. 3-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

397. *Research*. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

401. *Introduction to Graduate Study in Human Communication*. I. 3 hr. Major emphasis on designing and conducting experimental and laboratory research in human communication. Computer applications to social science research also given consideration. Should be taken the first semester of graduate study.

402. *Advanced Seminar in Research Methods*. II. 3 hr. PR: COMM 401. Research techniques necessary to conduct original communication research. Emphasis on advanced statistical techniques.

420. *Survey of Human Communication Theory*. I. 3 hr. Broad overview of contemporary theories in human communication. Should be taken the first semester of graduate study.

433. *Special Topics*. I, II, S. 3-12 hr. PR: Consent. Thorough study of special topics in human communication including interpersonal and small group, language, intercultural, organizational, persuasion, and mass communication, nonverbal communication, and communication education.

475. *Independent Study*. I, II, S. 1-3 hr. PR: Consent. Open to graduate students pursuing independent study in communication.

490. *Teaching Practicum*. I, II. 3 hr. PR: Consent. (Open only to graduate assistants in the Department of Communication Studies.) Supervised experience in classroom teaching.

491. *Advanced Study*. I, II, S. 3 hr. Advanced study in a variety of areas in human communication.

492. *Directed Study*. 1-6 hr. Directed study, reading, and/or research.

493. *Special Topics*. 1-6 hr. A study of contemporary topics selected from recent developments in the field.

494. *Special Seminars*. 1-6 hr. Special seminars arranged for advanced graduate students.

496. *Seminar in Human Communication*. I, II, S. 3-9 hr. Current problems and research in human communication.

497. *Research*. I, II, S. 1-15 hr.

499. *Thesis*. I, II, S. 3-6 hr.

Computer Science

Wayne A. Muth, Chairperson of Department of Statistics and
Computer Science

John M. Atkins, Director of Computer Science Graduate Programs
319 Knapp Hall

Degrees: Master of Science, Doctor of Philosophy

Areas of emphasis: Computer Science and Computer and Information Sciences

The master's degree is intended to qualify the student to assume a professional role in an educational, industrial, or governmental research project, teach in a junior or senior college, or undertake advanced training toward a doctorate in computer science. Because many students receive baccalaureate degrees from colleges which do not offer undergraduate programs in computer science, a student with an outstanding undergraduate record does not need a degree in computer science to enter the master's program.

Regular Admission

Applications from students not eligible for admission as regular graduate students and from foreign students are normally evaluated during January for admission to the summer session. Graduate Record Examination general test scores are required for admission into the master's program.

An applicant for admission to the master's degree program is expected to satisfy the following requirements for regular admission:

- A bachelor's degree in computer science, equivalent to that offered by this department, from an accredited college or university.
- A minimum undergraduate GPA of at least 3.0 on a 4.0 scale;
- At least a 3.0 GPA on all computer science, statistics, and mathematics course work;
- A GRE verbal score of at least the 50th percentile;
- A GRE quantitative score of at least the 50th percentile;
- A GRE analytical score of at least the 50th percentile.

Provisional Admission

Applicants for admission to the master's degree program who do not satisfy the criteria for regular admission will be granted provisional admission if they meet the following conditions:

- A minimum of 50th percentile on the quantitative and analytical components of the GRE;
- A cumulative GPA between 2.5 and 3.0 and a cumulative GPA between 2.5 and 3.0 on all computer science, mathematics and statistics course work undertaken.

Students admitted provisionally must maintain a GPA of at least 3.0 on all course work attempted.

Applicants who do not meet the minimum criteria for provisional admission may enroll as non-degree students and then apply for provisional admission when the criteria for provisional admission have been met.

Students admitted to the master's program who do not have an equivalent bachelor's degree in computer science may be required to enroll in one or more courses that represent deficiencies in their undergraduate curriculum. Students are minimally expected to know the material contained in the following courses:

- One year of calculus (MATH 15 and 16 or equivalent) and one semester of statistics (STAT 201 or equivalent).
- Documented knowledge of a high-level programming language such as Ada, C, Modula-2, PL/1, or Pascal (CS 15, 16, and 76, or equivalent).
- Assembler language and computer organization (CS 56 or equivalent).
- Discrete mathematics (CS 26 or equivalent).
- Analysis of algorithms (CS 126 or equivalent).
- Theory of programming languages (CS 136 or equivalent).
- Software engineering (CS 176 or equivalent).
- Theory of operating systems (CS 156 or equivalent).

Options

Two options are available for students seeking a master of science. The problem report option requires 36 hours of course work including three hours of credit for a problem report. The thesis option requires 30 hours of course work including six hours of credit for a thesis.

Blocks/Core Courses

Graduate courses in computer science are grouped into six blocks. The blocks and core courses in each block are as follows:

- Operating systems and architecture: CS 356, 366
- Programming languages: CS 336, 346
- Mathematics of computing: CS 315, 326
- Data semantics: CS 377, 378
- Software engineering: CS 375, 376
- Artificial intelligence and visualization: CS 386, 388

Each block has two courses that are designated core courses. These are prerequisites for advanced courses in each block.

Master of Science

Requirements Candidates for master's degrees must complete one core course in the operating systems and architecture block, one core course in the programming languages block, and one core course in the mathematics of computing block, as well as one core course each in any two of the three remaining blocks.

Candidates must complete two additional courses in one of the five blocks in which a core course was completed.

Candidates must complete two semesters of seminar (CS 396).

Candidates must pass qualifying examinations in five of six core areas.

Technical Electives Candidates may use six hours of graduate credit from approved technical electives at the discretion of the student's committee and the department chair. Approved technical electives include any statistics course except STAT 311, any electrical engineering or computer engineering course, and any mathematics course except MATH 333-337 inclusive.

No more than one course in which a grade of C is received may be counted toward meeting degree requirements.

Doctor of Philosophy

The doctor of philosophy is a research degree rather than a course work degree. Doctoral students are required to complete a number of advanced courses but more time is spent in original research in close association with an experienced researcher. The Ph.D. degree is intended to prepare a student for teaching and research in computer and information science for business, industry, and educational institutions.

Admission Requirements

An applicant for admission to the doctoral degree program is expected to satisfy the following requirements for regular admission:

- A bachelor's degree in computer science, equivalent to that offered by this department, from an accredited college or university;
- A minimum GPA of at least 3.0 on a 4.0 scale;
- At least a 3.0 GPA on all computer science, statistics, and mathematics course work;
- A GRE verbal score of at least the 50th percentile;
- A GRE quantitative score of at least the 50th percentile;
- A GRE analytical score of at least the 50th percentile.

Applicants not satisfying these requirements should work on a master's degree in computer science before applying for admission to the Ph.D. program.

Fall semester	March 1
Spring semester	October 1
Summer session	January 1

Applications are accepted at any time; however, no guarantee of admission can be made for a specific semester if the deadline has not been met. If applicants cannot enroll at the designated semester after a favorable admission decision, no guarantee is given that they will be permitted to enroll at a later time.

The Ph.D. requires a minimum of 18 hours of course work beyond the master's.

Qualifying Examinations Within three years of admission to the doctoral degree program, applicants must receive a high pass on departmental qualifying examinations, demonstrating a breadth of knowledge in computer science. A Ph.D. student who does not receive a high pass on the departmental qualifying examination in two attempts may transfer all credits earned at WVU toward acquiring a master's degree. To earn a master's degree, the student must satisfy all requirements for the degree.

It is anticipated that a doctoral student will complete a minimum of 42 hours of formal graduate-level (300- and 400-level) course work in computer science beyond the equivalent of a bachelor's degree in computer science, including 18 hours of advanced (400-level) graduate course work beyond that required for the departmental qualifying examination, with at most six of the 18 hours being in "directed reading" courses. Depending on a student's background, additional course work may be required.

All doctoral students must demonstrate reading competency in scientific literature written in a language other than a student's native tongue. The choice of a foreign language other than French, German, Russian, Japanese, or Spanish must be approved by the computer science graduate faculty.

Comprehensive Examination After satisfactorily passing the departmental qualifying examination, a doctoral student will be permitted to stand for the comprehensive examinations. These examinations will be prepared, administered, and evaluated by the student's

dissertation committee. All examinations must be taken within a span of two calendar weeks.

Dissertation Prospectus Usually after completion of the comprehensive examinations, the doctoral student will present a research prospectus to his/her dissertation committee, outlining the original research which the student is to perform. The prospectus will consist of a statement of the research problem, a review of the pertinent scientific literature in the area, and a description of the methods which will be employed by the student in an attempt to solve the research problem. After the committee has questioned the student on the prospectus and approved it as the doctoral research topic, the student will be recognized as a doctoral candidate.

Residency Doctoral candidates must satisfy the University's one-year residency requirement. It is expected that this one year of residency will be spent performing research after completion of the comprehensive examinations by completing nine hours of research in two consecutive semesters.

Dissertation After the doctoral candidate has completed the original research outlined in the prospectus, the dissertation will be presented to the dissertation committee, after which the candidate will formally defend his/her dissertation at a public meeting. Full degree requirements are met when the dissertation committee deems that the candidate has successfully completed the research outline in the prospectus and has performed satisfactorily in defense of the work. The degree is then awarded.

More information concerning graduate studies may be found in *Guidelines for Master's and Doctoral Students*, available through the department.

Computer Science (CS)

216. *Numerical Concepts*. 3 hr. PR: CS 126. Computer Arithmetic, Number representation, and errors; locating roots of equations; interpolation; numerical integration and differentiation; numerical solution of initial value problems for ordinary differential equations; solving systems of linear equations; data smoothing.

236. *Compiler Construction*. PR: CS 136. Theory and practice of the construction of programming language translators; scanning and parsing techniques, semantic processing, runtime storage organization, and code generation; design and implementation of an interpreter or compiler by students. 3 hr. lec.

246. *Automata Theory*. 3 hr. PR: CS 136. Introduction to formal languages, grammars, and automata; regular expressions and finite automata, context-free languages and linear-bound automata, and Turing machines and recursively enumerable languages. 3 hr. lec.

256. *Operating Systems Structure*. 3 hr. PR: CS 156. Support of computer components; device management and interrupts, process scheduling, file management, complete OS structure, OS development and debugging, configuration management, and performance testing. 3 hr. lec.

258. *Advanced Operating Systems*. 3 hr. PR: CS 256. Operating system topics not covered in CS 156 or 256; reliability and security, system management, and virtual machine structures; introduction to distributed and realtime systems; emphasis on design issues faced by actual systems. 3 hr. lec.

266. *Computer Organization and Architecture*. 3 hr. PR: CS 156. Computer structure, emphasis on implications for software design; evolution of computers; elementary digital

logic; CPU structures; memory and I/O structures; pipelining and memory management; introduction to parallel and high-level architectures. 3 hr. lec.

267. *Microprocessor Structures*. 3 hr. PR: CS 156. Typical microprocessor systems including OS architecture, assembly language programming, and interfacing capabilities. 3 hr. lec.

268. *Data and Computer Communications*. 3 hr. PR: CS 156. Introduction to fundamental concepts and principles of data and computer communications; digital data communication techniques; multiplexing, switching, LANs and WANs, and protocols and architecture. 3 hr. lec.

276. *Advanced Software Engineering*. 3 hr. PR: CS 176. Engineering process, project economics, project organizational and management issues, configuration management. 3 hr. lec.

278. *Database Design and Theory*. 3 hr. PR: CS 176. Relational data model using relational algebra and SQL and the object-oriented data model; relational database and semantic design theory. 3 hr. lec.

286. *Introduction to Artificial Intelligence*. 3 hr. PR: CS 176. Survey of AI techniques, heuristics search, game playing, knowledge representation schemes: logic, semantic net, frames, rule-based; natural language processing, advanced AI techniques/systems: planning, blackboard architecture, neural net model; AI implementation. 3 hr. lec.

288. *Introduction to Computer Graphics*. 3 hr. PR: CS 176. Overview of I/O hardware, elements of graphics software, fundamental algorithms, two dimensional viewing and transformations, design for interaction, and introduction to three-dimensional concepts. 3 hr. lec.

291. *Topics in Computer Science*. I, II, S. 3 hr. PR: CS 76 or equiv. Advanced study of topics in computer science.

301. *Computers in Research*. I. 3 hr. (Statistics and Computer Science majors should obtain their graduate committees' approval before registering.) Use of computers in research. Algorithms and programming. Scientific and statistical programming packages.

303. *Microcomputers in Mathematics/Science*. S. 3 hr. PR: MATH 3 or consent. An integrated course in computer science, statistics and mathematics for secondary educators. Focuses on programming techniques and uses problems from the areas of statistics and mathematics at the high school level as examples.

311. *Scientific Computing Applications*. II. 3 hr. PR: 76 or equiv. Application of mathematical modelling and simulation methodology, languages, and systems. Discrete simulation using GPSS-V language. Linear programming. Finite difference methods using higher level languages.

315. *Advanced Mathematics of Computation*. I. 3 hr. PR: MATH 215. Foundations of computer science; formal logic, graph theory, computability and complexity theories.

320. *Solution of Nonlinear Systems*. II. 3 hr. PR: CS 216 or MATH 241 or consent. Solution of nonlinear systems of equations. Newton and Secant Methods. Unconstrained optimization. Nonlinear overrelaxation techniques. Nonlinear least squares problems. (Equiv. to MATH 320.)

325. *Numerical Interpolation and Approximation*. I. 3 hr. PR: CS 216 or consent. Interpolation and approximation using Chebychev polynomials, Pade approximations, Chebychev economization of Taylor Series. Hermite interpolation, orthogonal polynomials and Gaussian Quadrature.

326. *Advanced Analysis of Algorithms*. II. 3 hr. PR: CS 126. Analysis and design techniques for efficient sequential and parallel algorithm design; NP-completeness, advanced analysis techniques, advanced algorithms, and parallel algorithms.

330. *Design of Language Processors*. II. 3 hr. PR: CS 236. Study of the design and construction of automatic programming language processors. Investigation of the structure of scientific and business oriented compilers, list processors, and information processing languages.

336. *Formal Specification of Language*. I. 3 hr. PR: CS 236. Specifications of language syntax and semantics by grammars and automata and by attribute grammars, denotational semantics, and action equations; algebraic, denotational, and operational semantics; application of formal specifications to construction of software tools.

346. *Advanced Automata Theory*. II. 3 hr. PR: CS 246. Survey of automata outside the Chomsky hierarchy with applicability to parallel processing, learning, temporal logic, and language processing.

350. *Software Engineering in Data Communications*. I. 3 hr. PR: CS 256 or consent. Data communication principles, software design techniques for implementing data communications systems, testing and debugging techniques, networks and data link control, software design in a network environment. A "hands-on" project in data communications design is included.

356. *Theory of Operating Systems*. I. 3 hr. PR: CS 256 or consent. Theoretical analysis of selected aspects of operating system design; topics include interaction of concurrent processes; scheduling and resource allocation; virtual memory management; access control; and distributed and realtime system issues.

365. *Distributed Database Management Systems*. II. 3 hr. PR: CS 278. Reference architectures for distributed database management systems. Integration of local databases stored at different sites into a global database. Heterogeneity of data models. Query translation and optimization. Synchronization of concurrent access. Integrity and reliability.

366. *Advanced Computer Systems Architecture*. II. 3 hr. PR: CS 266 OR CPE 272 or consent. High performance techniques, pipelined and parallel systems, and high-level architectures; comparative evaluation of architectures for specific applications; emphasis on software implications of hardware specifications.

375. *Software Verification and Validation*. II. 3 hr. PR: CS 136 and CS 176. Principles of formal software specification; formal verification, testing and other validation techniques.

376. *Formal Methods in Software Engineering*. I. 3 hr. PR: CS 276. Principles of rigorous specification, designing, implementation and validation of sequential, concurrent and realtime software; emphasis on reading current papers on these topics.

377. *Data: Types, Semantics and Abstraction*. II. 3 hr. PR: CS 176. Data type and structure specification, axiomatic and model-based specification, algebraic techniques, testing and verification specifications, data abstraction facilities in modern programming languages, examples and associated algorithms.

378. *Theory of Database Systems*. I. 3 hr. PR: CS 278. Abstract and newer database models; introduction to database design techniques in the context of semantic data modeling; equivalence of different relational models; object-oriented databases.
386. *Advanced Artificial Intelligence Techniques*. II. 3 hr. PR: CS 286. Reasoning under uncertainty; nonmonotonic reasoning, statistical reasoning, fuzzy logic; planning, parallel and distributed AI, natural language processing, learning, connectionist models, temporal logic, common sense knowledge and qualitative reasoning, AI techniques and robotics.
388. *Interactive Computer Graphics*. I. 3 hr. PR: CS 126. Viewing in three dimensions, projections, rendering of surfaces and solids, illumination and shading, interaction handling, display processors and programming systems, and graphics system organization.
390. *Teaching Practicum*. I and II. 1-3 hr. PR: Consent. Supervised practices in college teaching of computer science.
391. *Advanced Topics in Computer Science*. I, II, S. 3-6 hr. PR: Consent. Investigation in advanced computer science subjects not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
396. *Graduate Seminar*. I, II. 1 hr. PR: Consent.
397. *Research in Computer Science*. I, II, S. 1-15 hr. PR: Consent
415. *Computability and Recursive Function Theory*. 3 hr. PR: CS 315. Introduction to recursive function theory, approaches to computability, Church's thesis, decidability, recursive and recursively enumerable sets, numbering computable functions, Godel's incompleteness theorem, reducibility, and computational complexity.
418. *Information Dissemination*. 3 hr. PR: CS 326. Research issues in information dissemination in graphs; emphasis on broadcasting and gossiping algorithms, including identification and solution of open research questions.
428. *Advanced Neural Networks*. 3 hr. PR: CS 328 or equiv. Continuation of C S 328. Unsupervised learning: Hebbian and competitive; Hamming and Euclidean distance classifiers; discussion of Hamming, Maxnet, Kohonen, and ART 1 ANNs; presentation of papers by students from research literature.
458. *Distributed Systems and Algorithms*. 3 hr. PR: CS 126 and 356. Distributed and networked operating systems and the algorithms necessary to achieve such goals as transparency, sharing, fault tolerance, and efficient process and task scheduling.
472. *Information Modeling*. 2 hr. PR: CS 278 or 377, or consent. Information modeling, data definition languages, graphical information models (NIAM and IDEF), computer-readable information models (EXPRESS); information exchange and sharing using STEP application protocols.
475. *Advanced Software Verification*. 3 hr. PR: CS 336 or 375. Formal and practical modular verification of functionality and performance; soundness and completeness of proof systems; module testing.
477. *Software Reuse*. 3 hr. PR 375 or 376 or 37. Research issues in software reuse; formal methods, component engineering, and specification and programming languages.

478. *Advanced Databases Theory*. 3 hr. PR: CS 378. Design theory for relational databases; functional dependencies; multivalued dependencies and normal forms; project-join mappings, tableaux and the chase; representation theory.

486. *Global Knowledge Networks*. 3 hr. PR: CS 386 or consent. Representational formalisms and effective retrieval techniques to obtain information from international knowledge repositories connected via high-speed networks.

488. *Advanced Graphics and Multimedia*. 3 hr. PR: CS 388 and fluency in C, Unix and X; or consent. Computer graphics and multimedia; raster graphic architectures, advanced raster algorithms, ray tracing, radiosity, multimedia representation, multimedia communications and similar topics.

490. *Teaching Practicum*. I, II. 1-3 hr. PR: Consent. Supervised practice in college teaching of computer and information sciences.

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

492. *Directed Study*. I, II, S. 1-6 hr. Directed study, reading, and/or research.

496. *Graduate Seminar*. I, II. 1 hr. PR: Consent.

497. *Research*. I, II, S. 1-15 hr. PR: Consent..

English

Patrick W. Conner, Ph.D., Chairperson of the Department

Brian McHale, Ph.D. Supervisor

Elaine Ginsberg, M.A. Supervisor

Stansbury Hall

Degrees Offered: Master of Arts, Doctor of Philosophy

To be admitted to the Department of English as prospective candidates for the degree of Master of Arts, students are expected to have completed work comparable to the department's undergraduate requirement for English majors (but with records distinctly above the average), and to present as part of their applications their scores on the Graduate Record Examination General Aptitude Test, and, if nonnative speakers of English, their TOEFL scores. Past experience has shown that successful graduate students usually score at least the 60th percentile on the verbal section of the GRE.

Master of Arts

Admission The applicant may be admitted as a regular graduate student—one who is approved for a degree program; as a provisional graduate student—one who is accepted for study but at the time of acceptance does not meet all the requirements for regular admission; or as a non-degree graduate student. (The GRE and TOEFL scores are not required of non-degree graduate students.)

Course Requirements (No Thesis) M.A. students selecting the non-thesis option must successfully complete 30 hours, distributed as follows: nine hours of core courses; nine hours of author, topic, genre courses; nine hours of seminar courses (including ENGL

492); and three hours of unrestricted course work. No more than six hours of course work outside the Department of English can apply toward the 30-hour requirement. Students should check with the department about the most current courses available.

Course Requirements and Thesis A candidate for the M.A. degree may choose to take 24 hours of course work and write a thesis, for six hours credit, under the supervision of a thesis advisor. The thesis may be creative (a novel or a collection of short stories, poems, or literary essays with an analytic introduction) or scholarly. A candidate may register for up to 12 hours of thesis credit, but only six hours can be included in the 30 hours required for the degree. Thesis hours are graded as S (satisfactory) or U (unsatisfactory).

Students electing the thesis option are expected to defend their finished work before their thesis committees and any others who wish to attend the oral examination. The English Department requires no terminal examination. Instead, course distribution requirements and individual courses provide rigor and breadth, and only classes passed with a grade of B or better count toward the degree.

Language Requirement Two options are available for fulfilling the foreign language requirement. In the first option, students may take a graduate reading examination administered by the Department of Foreign Languages in French, German, classical Greek, Italian, Latin, Russian, or Spanish. In the alternative option, students may fulfill the language requirement by having successfully completed (with receipt of a grade of A or B in the last course) a second-year level of foreign language study at an accredited college or university (or its international equivalent) within the last five years.

Doctor of Philosophy

Admission Applicants for admission to the program will be judged on the bases of academic record, three recommendations from former teachers, a statement of purpose outlining their academic and professional goals, a sample of their academic writing, and the Graduate Record Examination Advanced Test scores. Nonnative English-speaking applicants must also present their TOEFL scores. All decisions on admission are made by the Ph.D. admissions committee.

Examinations and Requirements The doctoral program can be completed in three years of full-time study beyond the master's degree or its equivalent. During the first year in residence, students must enroll in English 499 *Graduate Colloquium*, and pass the qualifying examination. Thirty credit-hours must be taken prior to the examination for formal admission to candidacy. Full-time students are expected to enroll in nine credit-hours per semester. Only 300- and 400-level courses can be applied to the 30 credit-hours requirement; nine of these hours must be in 400-level seminars, one of which must be English 488 *Current Directions in Literary Study*. All doctoral candidates, unless they have previously taken an equivalent course, must take English 492 *Introduction to Literary Research*. Neither English 490 (required of all teaching assistants) nor English 492 may be substituted for the seminar requirements. Doctoral students must teach successfully in the department. Concurrent with the teaching practicum, six hours of teaching practicum (three for teaching composition and three for teaching literature) are also required. This requirement can be waived for those candidates with teaching experience approved by the department. Students are permitted only six hours of independent study, however. The dissertation carries 12 hours; thus, the typical Ph.D. program includes 48 credit hours.

Upon approval by the plan of study committee, students may choose to complete a minor, not to exceed 12 hours in 300- or 400-level courses, in a related subject offered by another department.

Language Requirement The foreign language options are the same as for the master's program and must be completed prior to taking the examination for formal admission to candidacy.

Doctoral Dissertation After completing course work, passing the examination for formal admission to candidacy, and fulfilling the language and teaching requirements, the student, under the direction of the dissertation committee chairperson, writes a prospectus of the final project. The dissertation, meant to be an original contribution to scholarship in its field, should be able to be completed in one year.

The final examination (oral defense of the dissertation) is scheduled by the dissertation director and is open to the public.

Core Courses

- 301. *The Graduate Writing Workshop*
- 310. *Old English 1 (Anglo-Saxon)*
- 312. *Medieval Literature*
- 313. *Renaissance Literature*
- 314. *Restoration and Eighteenth-Century Literature*
- 315. *Romantic Literature*
- 316. *Victorian Literature*
- 317. *Twentieth-Century British Literature*
- 320. *Studies in Composition and Rhetoric*
- 350. *Shakespeare*
- 370. *American Literature to 1865*
- 371. *American Literature, 1865 to 1915*
- 372. *American Literature, 1915 to Present*
- 383. *Recent Literary Criticism*

Author, Topic, Genre Courses

- 311. *Old English 2 (Beowulf)*
- 321. *Studies in Drama*
- 322. *Studies in Poetry*
- 323. *Studies in the Novel*
- 324. *Studies in Nonfiction Prose*
- 325. *Study of Selected Authors*
- 392. *Special Topics*

Seminars

- 440. *Seminar in Medieval Studies*
- 446. *Seminar in Renaissance Studies, 1550–1660*
- 460. *Seminar in Restoration and Eighteenth-Century Studies*
- 470. *Seminar in British Romanticism*
- 476. *Seminar in Victorian Studies*
- 484. *Seminar in American Studies*
- 485. *Seminar in Twentieth-Century British Studies*
- 488. *Current Directions in Literary Study*
- 492. *Introduction to Literary Research*
- 493. *Folger Institute Seminar*
- 494. *Seminar*
- 499. *Graduate Colloquium*

English (ENGL)

301. *Graduate Writing Workshop*. I, II. 3 hr. (With departmental consent, may be repeated for a maximum of 6 credit hours.) Advanced workshop in creative writing. Genre and focus varies from semester to semester. PR. Instructor consent.

310. *Old English 1*. I, II. 3 hr. Study of Anglo-Saxon with selected readings from the literature of the period.

311. *Old English 2*. I, II. 3 hr. PR: ENGL 310. *Beowulf* and other texts in Old English.

312. *Medieval Literature*. 3 hr. Readings in the literature of the Medieval period; attention to major writers and genres; focus on literary theory. 3 hr. lec.

313. *Renaissance Literature*. 3 hr. Readings in the literature of the English Renaissance; attention to major writers and genres; focus on literary history. 3 hr. lec.

314. *Restoration and Eighteenth-Century Literature*. 3 hr. Readings in the literature of England during the Restoration and the eighteenth century; attention to major writers and genres; focus on literary history. 3 hr. lec.

315. *Romantic Literature*. 3 hr. Readings in the literature of England during the romantic period; attention to major writers and genres; focus on literary history. 3 hr. lec.

316. *Victorian Literature*. 3 hr. Readings in the literature of England during the Victorian period; attention to major writers and genres; focus on literary history. 3 hr. lec.

317. *Twentieth-Century British Literature*. 3 hr. Readings on the literature of England during the twentieth century; attention to major writers and genres; focus on literary history. 3 hr. lec.

320. *Studies in Composition and Rhetoric*. 3 hr. Integration of theory with pedagogy for effective instruction, composition and rhetoric. Historical development of composition theory and current issues in rhetoric. 3 hr. lec.

321. *Studies in Drama*. 3 hr. Advanced study in the genre of drama, with emphasis varying from year to year. Course may include textual, historical, critical, formalist, and/or theoretical study. Not restricted to any one period or century.

322. *Studies in Poetry*. 3 hr. Advanced study in the genre of poetry, with emphasis varying from year to year. Course may include textual, historical, critical, formalist, and/or theoretical study. Not restricted to any one period or century.

323. *Studies in the Novel*. 3 hr. Advanced study in the genre of the novel, with emphasis varying from year to year. Course may include textual, historical, critical, formalist, and/or theoretical study. Not restricted to any one period or century.

324. *Studies in Nonfiction Prose*. 3 hr. Advanced study in the genre of nonfiction, with emphasis varying from year to year. Course may include textual, historical, critical, formalist, and/or theoretical study. Not restricted to any one period or century.

325. *Study of Selected Authors*. 3 hr. Advanced study of one or more major authors.

350. *Shakespeare*. I, II. 3 hr. Intensive study of selected plays. Special attention to textual problems and to language and poetic imagery, together with the history of Shakespearean criticism and scholarship.

370. *American Literature to 1865*. 3 hr. Readings in the literature of America from its beginnings to 1865; attention to major writers and genres; focus on literary history.

371. *American Literature, 1865-1915*. 3 hr. Readings in the literature of America from 1865-1915; attention to major writers and genres; focus on literary history.

372. *American Literature, 1915-Present*. 3 hr. Readings in the literature of America from 1915 to the present; attention to major writers and genres; focus on literary history.

383. *Recent Literary Criticism*. 3 hr. Brief survey of theories of major schools of recent criticism and an application of these theories to selected literary works.

392. *Special Topics*. I, II, S. 1-9 hr. PR: Consent. Advanced study of special topics in language, literature, or writing.

400. *Thesis*. I, II. 3 hr.

401. *Thesis*. I, II. 3 hr.

440. *Seminar in Medieval Studies*. I, II. 3 hr. Topics from English literature, 1100-1500.

446. *Seminar in Renaissance Studies, 1550-1660*. I, II. 3 hr. Studies in major authors and special topics in the Renaissance.

460. *Seminar in Restoration and Eighteenth-Century Studies*. I, II. 3 hr.

470. *Seminar in British Romanticism*. I, II. 3 hr. Studies in major authors and special topics in the field of British Romanticism.

476. *Seminar in Victorian Studies*. I, II. 3 hr. Research and discussion in selected topics in the literature and history of the period.

484. *Seminar in American Studies*. I, II. 3 hr. Seminar in principal authors and movements in American literature.

485. *Seminar in Twentieth-Century British Studies*. 3 hr. Seminar in principal authors and movements in twentieth-century British literature.

488. *Current Directions in Literary Study*. II. 3 hr. PR: Advanced graduate standing (English 383 recommended). Intensive study of one or more current approaches to literature and theories of criticism, with some emphasis on the interrelations of literary study with other disciplines.

490. *Teaching Practicum*. I, II. 3-6 hr. I—Supervised practice in college teaching of expository writing. II—Supervised practice in college teaching of literature.

491. *Advanced Study*. I, II. 3 hr. Specific topics approved by the instructor.

492. *Introduction to Literary Research*. I, II. 3 hr. Bibliography; materials and tools of literary investigations; methods of research in various fields of literary history and interpretation; problem of editing. Practical guidance in the writing of theses.

493. *Folger Institute Seminar*. I, II. 3 hr. PR: Graduate standing. (Enrollment is by special application only. Contact department chairperson for information.) Seminar conducted by distinguished scholars and held at the Folger Institute of Renaissance and Eighteenth Century Studies in Washington, D.C. Topics vary. (Also listed as HIST 493.)

494. *Seminar*. I, II. 3 hr. Specific authors to be approved by instructor.

497. *Research*. I, II. 1-15 hr. PR: Consent.

498. *Doctoral Thesis*. I, II. 1-6 hr. PR: Consent.

499. *Graduate Colloquium*. I, II. 1-6 hr. PR: Consent. Credit for this course may not be applied toward satisfaction of the 30-hour degree requirements at either the master's or doctoral level.

Foreign Languages

Frank W. Medley, Jr., Chairperson of the Department

205-B Chitwood Hall

Jeffrey Bruner, Graduate Coordinator

216 Chitwood Hall

Degree Offered: Master of Arts

The Department of Foreign Languages offers areas of emphasis for graduate study in French, German, Spanish (peninsular literature as well as Spanish-American literature), the teaching of English to speakers of other languages (TESOL), linguistics, and comparative literature. Graduate courses are also offered in classics, foreign literature in English translation, language teaching methods, and bibliography and research. Candidates for the master's degree are accepted in any of the areas of emphasis as long as they fulfill all requirements of the master of arts listed below.

Advisory Committee

The department chairperson is the official advisor for all departmental graduate students. The chairperson, or associate chairperson, serves as temporary advisor until the student requests, and has approved by the associate chairperson, a committee of three or more faculty members during his or her first semester of study. Students should inform themselves of faculty members' areas of expertise early in their first semester in order to facilitate committee selection. The student should request a meeting of his or her committee prior to preregistration for the second semester to get acquainted and discuss his or her professional goals. The student should develop a close working relationship with the committee and feel free to request a committee meeting whenever necessary—for guidance or course selection, advice on professional advancement, examinations, possible thesis topics, etc. Students may also request a revision of the composition of their committees when professional interests change.

Admission Prerequisites

A student is expected to have an undergraduate major in the areas of interest or be required to make up any deficiencies. The student should normally show an average of

at least 3.0 (B) in undergraduate foreign language courses.

- Minimum of 24 hours of course work in the department exclusive of 391 and 397 courses. (A total of 36 hours is required.)

- Maximum of three hours of 397 credit unless a thesis is undertaken, in which case six hours of 397 credit can be applied to the 36 required hours.

- No more than three hours of 391 credit can be applied to the 36 hours. (An exception can be made only if used to allow a student to enroll in a 200 course and student has already reached the maximum number of 200 credits.)

- Selection of areas of emphasis.

Four French literature courses

Linguistics 247 *Structure of Modern French*

Linguistics 341 *History of the French Language*

French 217 *French Culture* **or**

French 292 *French Civilization*

French 344 *Explication de Textes* **or**

French 326 *Literary Criticism*

Four German literature courses

Linguistics 257 *Structure of German*

Linguistics 351 *History of the German Language*

German 292 or 392 *German Culture and Civilization*

Area of emphasis I: Four peninsular literature courses

Spanish 223 *Estudios de Estilo* **or**

Spanish 324 *Explicacion de Textos*

Spanish 392 *Spanish Culture*

Linguistics 217 *Structure of Spanish*

Linguistics 311 *History of the Spanish Language*

Area of emphasis II: Four Spanish American literature courses

Spanish 223 *Estudios de Estilo* **or**

Spanish 324 *Explicacion de Textos*

Spanish 292 *Spanish American Culture*

Linguistics 217 *Structure of Spanish* **and**

Linguistics 311 *History of Spanish*

Area of emphasis III: Five courses in Peninsular and Spanish American literature (three courses in one area and two courses in the other).

Spanish 223 *Estudios de Estilo* **or** Spanish 324 *Explicacion de Textos*

Spanish 316 *Peninsular Culture* **and**

Spanish 292 *Spanish American Culture*

Linguistics 217 *Structure of Spanish* **and**

Linguistics 311 *History of the Spanish Language*

For those students writing a thesis, Spanish 223 or Spanish 324 may double count as a core requirement.

TESOL

Language 321 *Seminar Methods ESL*

Language 392 *Seminar Theory ESL*

Linguistics 392 *Seminar ESL Linguistics*

Linguistics 202 *Phonology*

ESL 391 *Advanced Topics American Culture*

Four courses from the following:

English 211 *History of the English Language*

English 220 *American Poetry*

English 235 *American Drama*

English 245 *Studies in Appalachian Literature*
 English 266 *American Romanticism*
 English 280 *Southern Writers*
 English 292 *Special Topics*
 English 294 *Fiction for Adolescents*
 English 321 *Studies in Drama**
 English 322 *Studies in Poetry**
 English 323 *Studies in the Novel**
 English 324 *Studies in Nonfiction Prose*
 English 325 *Studies of Selected Authors**
 English 340 *The American Novel to 1915*
 English 370 *American Literature, 1830-1865*
 English 371 *American Literature, 1865-1915*
 English 372 *American Literature, 1915 to Present*
 English 392 *Special Topics* (with approval of FL Department)

Minimum of six linguistic courses including:

Linguistics 202 *Phonology*
 Linguistics 283 *Transformational Grammar*
 Linguistics 383 *Advanced Transformational Syntax*
 Linguistics 392 *Seminar Advanced Phonology*
 One culture course of a contrastive nature

In lieu of four literature courses, two of the following can substitute for literature courses: (One may double count for the linguistics requirement for those students writing a thesis.)

Linguistics 311 *History of Spanish*
 Linguistics 341 *History of French*
 Linguistics 351 *History of German*
 English 211 *History of English*
 Linguistics 353 *Middle High German*
 Linguistics 313 *Old Spanish*
 Linguistics 343 *Old French*
 English 310 *Old English*
 English 311 *Old English*

Seven courses of literature

(five of the seven must be in the Department of Foreign Languages)

FLIT 369 *Comparative Literature*
 One culture course of a contrastive nature
 One of the following linguistics courses:
 Linguistics 311 *History of Spanish*
 Linguistics 313 *Old Spanish*
 Linguistics 341 *History of French*
 Linguistics 343 *Old French*
 Linguistics 351 *History of German*
 Linguistics 353 *Middle High German*
 English 211 *History of the English Language*
 English 310 or 311 *Old English*

Other students may petition for another area of emphasis which falls within the general guidelines but is not listed above. A detailed plan must be submitted and approved by a committee appointed by the department chairperson.

International Students

All international students whose native language is not English must demonstrate proficiency in English. Proficiency may be demonstrated in either of the following ways:

- TOEFL of 550 and TSE of 230
- ACTFL oral proficiency rating of two and successful passing of a department English writing examination

Students choosing areas of emphasis in French, German, or Spanish must demonstrate proficiency in that language by achieving a 2+ oral proficiency rating and successfully passing the departmental writing examination in that language.

Language Proficiency

Students who choose areas of emphasis in TESOL, linguistics, or comparative literature and whose native language is English must demonstrate proficiency in a second language by achieving an oral proficiency rating of two and passing the departmental written examination in that language, or presenting four semesters or the equivalent of two foreign languages with at least a B average.

Students choosing the TESOL area of emphasis whose native language is not English must demonstrate a higher level of English proficiency than that required in point five. Proficiency for those students may be demonstrated in one of the following ways:

- TOEFL of 600 and TSE of 250.
- ACTFL oral proficiency rating of 2+ and successful passing of the departmental advanced English writing examination.

If required courses are not offered during the time the student is enrolled, he/she may request permission to make appropriate substitutions. Students must declare the area of emphasis they intend to follow at the time of their initial registration. Students can request changes in their area of emphasis before the semester in which the student takes his/her written examinations.

Other Requirements

- A 3.0 GPA is required for graduation.
 - Demonstration of ability to undertake research and to write clearly and succinctly.
- The three possible areas of emphasis for fulfilling this requirement are listed in the departmental graduate student handbook.

• Seven-hour written examination based upon the reading list. Students will have a reading list composed of seven sections. One may be drawn up by the student and the student's major advisor or selected from the master reading list. Candidates who write a thesis will have the number of sections (and hours of the examination) reduced to four. Five of the seven exams must be in the student's area of emphasis unless the student writes a thesis; in this case, all four must be in the area of emphasis.

- A one- to two-hour oral examination based upon course work and/or thesis.

Graduate Assistants

All graduate assistants are required to complete Language Teaching Methods 421 as part of the work in the major fields unless they have had a similar course in their undergraduate study. The candidate's committee, together with the student, will determine the distribution of courses and the thesis requirement in the light of the student's aims and needs. The committee also will administer the oral comprehensive examination near the end of the candidate's course of study. Both oral and written examinations are normally given only twice a year, in November and in April. Graduate assistants are required to enroll each semester in Lang. 490 and 499, although these credits do not count toward the master's.

Because of staff scheduling difficulties, students should not expect to have their committees available for the completion of work on their degrees for summer graduation.

Thesis

A thesis, if chosen, must be submitted to the student's committee chairperson at least one month before the end of the enrollment period in which the student expects to complete all requirements for graduation. If this requirement is not met, thesis acceptance may be withheld for one semester.

An acceptable thesis proposal, including a problem statement, a thorough review of the literature, and an appropriate research design, is to be submitted to, and approved by, the student's committee before a thesis can be undertaken. Normally this proposal is submitted at least one semester before undertaking the writing of the thesis.

The thesis defense will be approximately one hour in length and is given after successful completion of the written examinations on elective master's reading list sections and the oral examination on course work.

One bound copy of the approved thesis is to be given to the Department of Foreign Languages upon completion of work for the degree.

Normally, the master's program requires four full semesters of study. Graduate assistants in particular should take this fact into account when planning their programs.

Study Abroad

Courses in German have been offered in Germany and Austria during the summer, in Spanish in Spain, Mexico, and Colombia during the summer, and in French in Canada during the summer and in France during the fall, spring, and summer. Students participating in a fall or spring semester abroad enroll for 15-18 semester hours of credit.

The Department of Foreign Languages generally offers a spring and a summer session in France and a summer session in Austria and in Spain or Mexico—contingent upon funding and faculty availability.

Bibliography and Research (BIBY)

301. *Introduction to Research*. I. 1-3 hr. (For seminar credit, counts as 1 hour; for a specific project carried out during the course, counts as 3 hours.) PR: Graduate standing. Pro-seminar in graduate-level research in foreign languages, literature, and linguistics.

365. *Methods of Research*. I. 3 hr.

Classics (CLAS)

201. *Roman Novelists*. I. (Alternate Years.) 3 hr. PR: CLAS 109, 110, or consent.

202. *Roman Comedy*. II. (Alternate Years.) 3 hr. PR: CLAS 109, 110, or consent.

235. *Roman Epic*. I. 3 hr. PR: CLAS 109, 110, or equiv.

292. *Pro-Seminar in Latin or Greek Literature*. 1-6 hr.* PR: Consent. Special topics.

392. *Seminar in Latin or Greek Literature*. 1-6 hr.* PR: Consent. Special topics.

397. *Master's Degree Research or Thesis*. I, II. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

English as a Second Language

391. *Advanced Topics*. I, II. 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

Foreign Literature in Translation (FLIT)

211. *Chinese Literature in Translation*. I. 3 hr. Survey of selected works of Chinese literature from ancient times through the eighteenth century.

221. *Japanese Literature in Translation*. II. 3 hr. Survey of selected works of Japanese literature from ancient period to the mid-nineteenth century and an introduction to a few works of the modern period.

241. *Women Writers of Spain*. 3 hr. Major women writers of Spain from the earliest extant manuscripts to the present; focus on twentieth-century works.

263. *French Women Writers*. II. 3 hr. Selected works of French women writers.

292. *Pro-Seminar*. I, II, S. 1-6 hr.* PR: 6 hr. of upper-division literature courses or consent. Special topics.

369. *Comparative Literature: Theory and Practice*. I. 3 hr. PR: Reading fluency in at least one foreign language. Conceptual bases of comparative literature and their application to literary interpretation.

392. *Seminar*. I, II, S. 1-6 hr.* PR: 6 hr. of upper-division literature courses or consent. Special topics.

French (FRCH)

203. *Conversational French*. I. 3 hr. PR: FRCH 110 or consent. Intensive spoken French.

217. *French Civilization*. II. 3 hr. PR: 12 hr. of French.

221. *The Romantic Movement*. I. 3 hr. PR: 18 hr. of French or consent.

222. *French Realism*. II. 3 hr. PR: 18 hr. of French or consent.

229. *Literature of the Sixteenth Century*. I. 3 hr. PR: 18 hr. of French or consent.

231. *Phonetics and Pronunciation*. II. 3 hr. PR: 12 hr. of French or equiv.

232. *Literature of the Eighteenth Century*. 3 hr. PR: 18 hr. of French or consent. Survey of major literary works of eighteenth-century France.

292. *Pro-Seminar*. I, II, S. 1-6 hr.* PR: 18 hr. of French or consent. Special topics.

305. *Fundamentals for Reading French*. I. 3 hr. PR: Graduate or upper-division standing. (FRCH 305 and 306 is intended for graduate students from other departments to teach them to read general and technical French.)

306. *Reading French*. II. 3 hr. PR: 12 hr. of French or equiv. or FRCH 305. (Graduate students may meet a doctoral foreign language requirement by achieving a grade of B or better in this course.)

326. *Literary Criticism*. II. 3 hr. PR: B.A. in French or consent.
337. *Moliere*. II. 3 hr. PR: B.A. in French or consent.
344. *Explication de Textes*. II. 3 hr. PR: 24 hr. of French or equiv.
371. *The Modern Novel to 1930*. I. 3 hr. PR: B.A. in French or consent.
372. *The Novel After 1930*. II. 3 hr. PR: B.A. in French or consent.
374. *French Women Writers*. 3 hr. PR: B.A. in French or consent. Selected works of French women writers.
381. *Medieval French Literature*. II. 3 hr. PR: LING 342 or consent.
391. *Advanced Topics*. I, II. 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.
392. *Seminar*. 1-6 hr.* PR: Consent. Special topics.
397. *Master's Degree Research or Thesis*. I, II. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

German (GER)

243. *Medieval German Literature*. I. 3 hr. PR: 18 hr. of German or consent.
245. *Classicism and Romanticism*. I. 3 hr. PR: 18 hr. of German or consent. Critical study of German literature from 1750 to 1830.
246. *The Liberal Age*. II. 3 hr. PR: 18 hr. of German or consent. Critical study of German literature from 1830 to 1880.
247. *The Age of Crisis*. I. 3 hr. PR: 18 hr. of German or consent. A critical study of German literature from 1880 to present.
292. *Pro-Seminar*. 1-6 hr.* PR: Consent. Special topics.
301. *Independent Reading*. PR: Consent. I. 3 hr. Supervised reading for students who wish to do intensive work.
302. *Independent Reading*. II. 3 hr. PR: GER 301. Continuation of GER 301.
305. *Fundamentals for Reading German*. I. 3 hr. PR: Graduate or upper-division standing. (GER 305-306 is intended for graduate students from other departments to teach them to read general and technical German.)
306. *Reading German*. II. 3 hr. PR: 12 hr. of German or equiv. or GER 305. (Graduate students may meet a doctoral foreign language requirement by achieving a grade of B or better in this course.)
376. *The Modern Novel*. I, II. 3 hr. PR: 24 hr. of German or consent. A study of representative modern novels from 1900 to 1945.

391. *Advanced Topics*. I, II. 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

392. *Seminar*. 1-6 hr.* PR: Graduate standing or consent. Special topics.

397. *Master's Degree Research or Thesis*. I, II. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

Language Teaching Methods (LANG)

221. *The Teaching of Foreign Languages*. I. 3 hr. PR: Consent. Required of all students who are prospective foreign language teachers on the secondary level.

292. *Pro-Seminar*. I, II, S. 1-6 hr.* PR: Consent. Special topics.

321. *ESL Methods*. I, II, S. 3 hr. Theory and practice of teaching English as a second language; techniques and approaches for teaching speaking, listening, reading, and writing skills.

391. *Advanced Topics*. I, II. 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

392. *Seminar*. I, II, S. 1-6 hr.* PR: Consent. Special topics.

397. *Master's Degree Research or Thesis*. I, II. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

421. *Teaching Foreign Language in College*. I, II. 1-6 hr.* Methods and techniques of teaching a foreign language at the college level.

490. *Teaching Practicum*. I, II, S. 1-3 hr.

499. *Graduate Colloquium*. I, II, S. 1-6 hr.* Required each semester of all graduate assistants in the Department of Foreign Languages.

Linguistics (LING)

202. *Phonology*. I. 3 hr. PR: LING 1, 111 or consent. Description of sounds and sound systems in language. Articulatory phonetics. Structural and generative approaches to phonetics.

217. *Structure of Spanish*. I. 3 hr. PR: 18 hr. of Spanish and LING 111 or consent. Description of the phonological or grammatical systems of Spanish, with emphasis on contrastive analysis (Spanish/English) and applied linguistics.

247. *Structure of Modern French*. I. 3 hr. PR: 18 hr. of French and LING 111 or consent. Study of phonology, morphology, and syntax of modern French together with a contrastive analysis of French and English.

257. *Structure of German*. II. 3 hr. PR: 18 hr. of German and LING 111 or consent. Phonological, morphological, and syntactical structure of contemporary German language.

267. *Structure of Russian*. II. 3 hr. PR: 18 hr. of Russian and LING 111 or consent. Phonological, morphological, and syntactical structure of contemporary Russian.

283. *Transformational Grammar*. S. 3 hr. PR: LING 111 and consent. Emphasis on generative syntax in English, German, Romance, and Slavic languages.
284. *History of Linguistics*. I. 3 hr. PR: LING 111 or consent. Development of linguistics from Greeks and Romans to contemporary researchers with concentration on major linguists and schools of the nineteenth and twentieth centuries.
288. *Sociolinguistics*. I. (Alternate Years.) 3 hr. PR: LING 1 or 111 or consent. Linguistic study of geographical and social variation in languages; effects of regional background, social class, ethnic group, sex, and setting; outcomes of conflict between dialect and between languages.
292. *Pro-Seminar*. 1-6 hr.* PR: Consent. Special topics.
311. *History of the Spanish Language*. II. (Alternate Years.) 3 hr. PR: 18 hr. of Spanish and LING 111 or consent. Evolution of Castilian from Vulgar Latin to its modern standard form through a study of historical phonology, morphology, and syntax, together with the external factors which influenced the development of the language.
313. *Old Spanish*. II. 3 hr. PR: Consent.
331. *Applied Linguistics*. 3 hr. PR: LING 111 or equivalent and prior study of a second language or consent. Study of the use of linguistic analysis in improving how pronunciation, grammar, and vocabulary are presented in foreign language courses.
341. *History of the French Language*. II. (Alternate Years.) 3 hr. PR: 18 hr. of French and LING 111 or consent. Evolution of French from Vulgar Latin into the Modern French standard through a study of historical phonology, morphology, and syntax, together with the external factors which influenced the development of the language.
343. *Old French*. I. 3 hr. PR: Consent. Study of the oldest monuments of the French language including the *Chanson de Roland* and *Aucassin et Nicolette* in an effort to trace the evolution of Francien, Anglo-Norman, and Picard and Vulgar Latin.
351. *History of the German Language*. II. (Alternate Years.) 3 hr. PR: 18 hr. of German and LING 111 or consent. Historical development of standard German with emphasis on its relationship to the other German languages and dialects.
353. *Middle High German 1*. I. 3 hr. PR: 18 hr. of German and LING 111 or consent. Study of the linguistic developments of Middle High German from the eleventh to the fifteenth centuries with illustrative readings from the *Nibelungenlied*.
361. *History of the Russian Language*. II. (Alternate Years.) 3 hr. PR: 18 hr. of Russian and LING 111 or consent. Development of Russian from Indo-European to the present.
363. *Language Change and Reconstruction*. 3 hr. PR: LING 111 or equivalent. Exploration of the mechanisms of language change, theories of diachronic linguistics, and techniques for reconstructing unattested languages; concentration on the Indo-European family and its history.

383. *Advanced Transformational Syntax*. I. 3 hr. PR: LING 283 or consent. Examination and discussion of theoretical issues in generative-transformational syntax. Focus on specific proposals advanced within the framework of Government-Binding Theory.

387. *Psycholinguistics*. I. 3 hr. PR: LING 111 or consent. Provides an insight into the many areas of psycholinguistics study, including language acquisition, sentence processing, animal communication, dichotic listening, aphasia, and semantics.

391. *Advanced Topics*. I, II. 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

392. *Seminar*. 1-6 hr.* PR: Consent. Special topics.

397. *Master's Degree Research or Thesis*. I, II. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

Russian (RUSS)

292. *Pro-Seminar*. 1-6 hr.* PR: 18 hr. of Russian or equiv.

Spanish (SPAN)

221. *Golden Age Literature*. II. 3 hr. PR: 24 hr. of Spanish or consent. Consideration of Spanish literature of the Renaissance and the Counter Reformation with readings in the novel, the *comedia*, and lyric poetry.

223. *Estudios De Estilo*. I. 3 hr. PR: 18 hr. of Spanish or equiv.

224. *Introduccion a la Literatura*. II. (Alternate Years.) 3 hr. A study of basic genres, themes, and techniques. Intensive reading of selected texts from various periods. Emphasis on Peninsular and/or Spanish American literature.

292. *Pro-Seminar*. 1-6 hr.* PR: Consent. Special topics.

315. *Lyric Poetry*. I. 3 hr. PR: 24 hr. of Spanish or equiv.

324. *Explicacion De Textos*. II. (Alternate years.) 3 hr. PR: 24 hr. of Spanish or equiv.

325. *The Picaresque Novel*. I. 3 hr. PR: 24 hr. of Spanish or equiv.

326. *Cervantes*. II. 3 hr. PR: 24 hr. of Spanish or consent.

391. *Advanced Topics*. I, II. 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled classes.

392. *Seminar*. 1-6 hr.* PR: Consent. Special topics.

395. *Sixteenth Century Literature*. I. 3 hr. PR: B.A. in Spanish or consent.

397. *Master's Degree Research or Thesis*. I, II. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

Geography

Trevor Harris, Chairperson of the Department of Geology and Geography

Daniel Weiner, Associate Chairperson for Geography

425 White Hall, P.O. Box 6300

**Degrees Offered: Master of Arts, Doctor of Philosophy
with a major in Geography**

The graduate program in geography at West Virginia University provides students with the opportunity to study for a master of arts or a doctor of philosophy degree with an area of emphasis in one of the following fields:

- Regional development and planning
- Geographic information systems and remote sensing
- Environmental and resource geography

Research

Students who are interested in pursuing research in an area other than these may do so provided the research area matches the interest of a faculty member in the department who agrees to supervise the student's program. Students who wish to focus their research on a particular region are encouraged to do so. The graduate program in geography at WVU has strong links with the University's Regional Research Institute, the geology program, the Water Research Institute, the international studies program, the West Virginia Geological and Economic Survey, the Center for Women's Studies, and the Center for Black Culture and Research.

Admission/Application Requirements

Master of Arts applicants should submit GRE scores, a personal two-page statement defining the applicant's interest in geography and career intentions, and two letters of recommendation from people who are familiar with the student's undergraduate training. Ph.D. applicants should send three letters of recommendation, GRE scores, and a personal, two-page statement defining the applicant's interest in geography and career intentions. This material should be forwarded directly to the coordinator of the geography graduate program at the departmental address.

Prospective students must have an overall undergraduate GPA of 2.75 and a 3.0 GPA for undergraduate geography courses. Students with degrees in other disciplines are encouraged to apply although they may be asked to make up deficiencies in geography during the first year in the program.

Master of Arts

Each incoming student is interviewed prior to the first semester to ascertain the student's interests and to assess whether the student has academic deficiencies. All students are initially supervised by the coordinator of the graduate program until the student develops a more clearly defined research interest. During the early part of the second semester of residence, a first year progress interview will be held with Department of Geography Graduate Studies Committee. The purpose of the meeting is to discuss student progress in the program and to facilitate the process of choosing an M.A. thesis advisor and committee. Two of the three committee members (including the advisor) must be geography faculty members at WVU. Students may change advisor or committee members after consultation with the advisor and the Department of Geography Graduate Studies Committee. In cases where a student is performing significantly below expectations, the progress interview may result in non-continuance in the program.

Course Work A student will be awarded the master of arts degree after completing a minimum of 30 hours of graduate credit, including one required course in the philosophy, theory, and practice of geography (GEOG 301) and one course in research methods (GEOG 302). The student will also select four elective courses, three of which must be in geography, that provide training in the student's area of specialization. The student must also complete Geography 300 *Colloquium* for each semester of residence.

Thesis The thesis and thesis defense will represent the outcome of independent research undertaken by the student. The thesis must reflect the student's knowledge of the literature pertaining to the subject matter of the thesis and be regarded by the student's program committee as a contribution to the discipline of geography. The student's committee will determine the proposal's acceptability. If it is deemed unacceptable, a further presentation may be required. The proposal must be typed and copied to the committee at least two weeks prior to the presentation. A full proposal of the thesis research will be presented to the faculty in an oral presentation at the end of the second semester or beginning of the third semester. The defense of the thesis will take place when the student and his/her committee agree that a defensible copy of the thesis is complete. It is expected that full-time students shall not need more than two years to satisfy all program requirements. The thesis examination is graded on a pass/provisional pass/fail basis by a majority vote of the committee. A student who fails may submit another thesis or a revised version upon the approval of the student's committee. No student may be reexamined more than once. A student who is given a provisional pass will generally be required to make minor revisions or corrections to the thesis.

Doctor of Philosophy

Prospective doctor of philosophy students must have a master's degree. Students with degrees in other disciplines are encouraged to apply, but they may be asked to make up deficiencies in geography during their first year in the program. Incoming geography students may also be asked to make up deficiencies if any are found during the student's entry interview with faculty. This interview is immediately prior to the first semester of the program.

Students are expected to be well grounded in one of the program's areas of emphasis, and also in the history and philosophy of geography. Students will be awarded a Ph.D. after obtaining 54 hours of graduate credit, completing certain required courses, passing comprehensive examinations, and writing a dissertation. These steps are discussed in more detail below.

Course Work The course *Geographic Traditions* (GEOG 301) and *Geographic Research Design* (GEOG 302) are required, as well as three general electives and two method electives. An additional 11 hours of other courses, which may include seminars and directed study courses, must also be completed. A limited number of the required courses may be waived if the student has already completed an equivalent course and can demonstrate proficiency with the material.

Examinations and Dissertation Oral and written comprehensive examinations which cover the student's knowledge in two areas of specialization, and the research topic form the second part of the doctoral program requirements. Upon successful completion of the comprehensive examination the student will be expected to defend a dissertation research proposal. The award of the Ph.D. is granted upon the successful defense of the dissertation itself.

Teaching Assistantships

The geography graduate program has available several teaching and research assistantships each year, which are allocated to qualified students on a competitive basis. These awards include a full tuition waiver. Additionally, meritorious tuition waivers are offered on a competitive basis to outstanding students who do not receive assistantships. Teaching assistantships are awarded annually and for no more than four semesters for M.A. students and six semesters for Ph.D. students. Assistantships are reconfirmed each year based on performance in the previous year with respect to both assistantship duties and academic progress. Requests for teaching assistantships and tuition waivers should be sent directly to the coordinator of graduate studies in geography. The deadline for receipt of the latter application is March 15.

Research Assistantships

Research assistantships must be applied for through the faculty member whose research is providing the funding. The geography faculty are engaged in numerous funded research projects, many of which provide graduate students with opportunities for obtaining research skills and experience as well as employment and tuition aid. Furthermore, the professional contacts made in the course of faculty research frequently provide graduate students with opportunities for career development. General information regarding the availability of research assistantships may be obtained from the coordinator of graduate studies. For further information on deadlines, requirements for waivers, the dollar value of assistantships and tuition waivers, please contact the geography graduate program coordinator.

Computing Facilities

The geography program's computing facilities are based on a stand-alone DEC local area network within the department. The LAN supports teaching and research in GIS, remote sensing, and spatial statistics. Currently, the system is centered on VAX 4000, VAX 3900, and VAX 3500 multi-user machines. Twelve workstations are clustered via Ethernet. The teaching laboratory is based upon INTEL 386 and 486 PCs networked via Ethernet to the cluster and supporting graphic terminal emulation. The system has in excess of nine gigabytes of on-line storage and magnetic tape drives. It supports Tektronix graphic workstations, multiple terminals, four digitizers, a color scanner, and a 36" color electrostatic plotter and a dye sublimation printer. Major hardware upgrades are scheduled.

The computer equipment is housed in recently renovated computer laboratories within the department. The labs represent state-of-the-art computing facilities funded by the NSF and WVU. The laboratory provides hands-on capability for research and teaching as well as computer-based lecture facilities and is among the most sophisticated facilities in the country.

The laboratory operates ESRI's ARC-INFO in both multi-user and workstation environments. TYDAC SPANS raster GIS operating under OS/2 is supported on the personal computers. ERDAS Imagine and GRASS are installed on the workstations. The laboratory has SAS, SAS-Graph, Surface III, Oracle, and extensive database, graphics, spreadsheet, and statistical packages. Dynamic Graphics 3D EMOD software is currently being installed on a dedicated workstation for GIS applications. The computer system is linked to WVNET's mainframe IBM and VAX installations for access to all major software and to the BITNET and INTERNET electronic networks.

The remote sensing program operates a full-range, portable GER MK IV spectroradiometer.

Geography (GEOG)

200. *Geography Data Analysis*. I. (Alternate years.) 3 hr. Quantitative techniques for collection, classification, and spatial analysis of geographical data with emphasis on map analysis and application of spatial statistics.

201. *Geography of WV and Appalachia*. II. 3 hr. PR: GEOG 8 or consent. Geographic analysis of the changing socio-economic activities and physical environment in West Virginia and Appalachia. Emphasis on the historical development of the state and region and contemporary spatial and social inequalities.

202. *Political Geography*. II. 3 hr. Examines the interrelationship between politics and the environment, human territoriality, the political organization of space, geopolitical aspects of the nation-state and international problems.

205. *Hist Geog U.S. Environment*. II. 3 hr. Surveys natural resource exploitation and environmental alteration in the United States from 1600 to the present with consideration of changing natural resource, conservation, and environmental perceptions and policies.

209. *Industrial Geography*. 3 hr. PR: GEOG 109 or consent. Introduction to theories and concepts of industrial geography; emphasis on the interdependence of the world economy and spatial patterns of industrial restructuring; case studies from various industrial sectors and regions.

210. *Global Issues: Inequality and Interdependence*. II. (Alternate Years.) 3 hr. PR: GEOG 1 or 2 or 8. Themes of spatial equity and justice in an increasingly interdependent world system. Contemporary issues concerning location, place, movement, and region.

211. *Rural and Regional Development*. 3 hr. PR: GEOG 2 or 8. An investigation into rural and regional development in developed and underdeveloped regions. The relationship between development theory and policy is explored.

212. *Geography of Gender*. 3 hr. PR: GEOG 8 or consent. An exploration of how gender affects spatial patterns and processes. Theoretical and empirical aspects of feminism are analyzed, including women and employment, Third World feminism, sexuality and space, and gender in academia.

215. *Environmental Systems Geography*. II. 3 hr. GEOG 7, equivalent, or consent. A geographic analysis of the earth system emphasizing the interdependence and feedback mechanisms of the hydrologic cycle, ecosystems and climate.

219. *Problems in Geography*. I, II. 1-9 hr. PR: Consent. Independent study or special topics.

220. *Seminar in Geography*. I, II. 1-9 hr. per sem.; max. 15 hr. PR: Consent. Includes separate seminars in urban, economic, physical, behavioral, social, Appalachian, transportation, census, planning, resource, international studies, geographic model building, rural problems, cartography, aging and environment, and energy.

221. *Geomorphology*. II. 3 hr. PR: GEOL 1. (Optional field trip at student's expense.) An examination of the physical processes which shape the surface of the earth, with emphasis on fluvial processes and environmental geomorphology. (Also listed as GEOL 221.)

225. *Urban and Regional Planning*. II. 3 hr. PR: GEOG 110 or POLS 121 or consent. Explores concepts, techniques, and processes of physical and socio-economic planning and their application to urban and regional problems.

230. *Land Use Policy*. (Alternate years.) 3 hr. PR: GEOG 225 or consent. Basic concepts of land use policy at the national, regional, county, and local level are examined. Environmental and land use policies are analyzed.
250. *Introduction to GIS*. 4 hr. Geographic information systems (GIS) in principle and practice. Spatial data handling in a computer environment; data, analysis, production and display for planning and decision-making. 3 hr. lec., 1 hr. lab.
252. *Geographical Informational Systems Applications*. (Alternate Years.) 3 hr. PR: GEOG 200 and GEOG 250. Operational and management issues in planning management analysis, locational decision making and design and implementation of GIS. Lab project emphasizes student's specialization. 2 hr. lec., 1 hr. lab.
253. *Geographic Information System Design*. PR. Consent. Geographic database design and implementation using contemporary vector software in a GIS project.
255. *Introduction to Remote Sensing*. I. 3 hr. PR: Theory, technology and applications of photointerpretation and digital image analysis of aerial photography and multispectral images. 2 hr lec., 1 hr lab. (Also listed as GEOL 255.)
262. *Digital Cartography*. 3 hr. PR: GEOG 161 or consent. Computer-assisted mapping emphasizing the appropriate uses of software in thematic and topographic map design, annotation, symbolization, color, design, display, and reproduction.
266. *Field Camp*. 3-6 hr. Observations, data gathering, and other techniques for understanding physical environment, human geography, and culture; off-campus field experience. 3 hr. lec., 3 hr. field camp.
285. *Methods of Geographic Research*. I. (Alternate Years.) 3 hr. PR: Consent. Geographic analysis as problem-solving activity. Practical experience in field techniques, library research, hypothesis formation and testing, and report preparation and presentation. Students will acquire skills in literary and numerical approaches to geographic data analysis.
290. *Geographical Perspectives on Energy*. II. 3 hr. PR: Consent. A survey of the distribution of finite, renewable, and continuous energy resources and an investigation of the geographical patterns of energy consumption and energy flows. The policy implications of an unequal distribution of energy are evaluated.
295. *Internship*. I, II, S. 1-12 hr. PR: Junior standing and consent. A working internship with an agency or company designed to give the student experience in the practical application of geographic training to specific problems.
299. *Honors Thesis*. I, II, S. 3-6 hr. PR: Departmental consent. Thesis proposal, writing, and defense for students admitted to the Honors Program.
300. *Geography Research Colloquium*. I, II. 1 hr. PR: Consent. Lectures and presentations on recent and current research by resident and visiting scholars.
301. *Geographic Traditions*. 3 hr. PR: consent. Review of the major approaches in geographic scholarship.

302. *Geographic Research-Design*. II. 3 hr. PR: GEOG 200 and GEOG 301. Choosing, preparing, and developing research problems of geographic interest. Emphasizes proposal writing and research design alternatives.

309. *Advanced Industrial Geography*. 3 hr. PR: GEOG 209 or consent. Examination of theoretical perspectives and applied research in industrial geography; focus on international industry and employment trends with case studies from developed and under-developed countries.

315. *Development Geography*. 3 hr. PR: Consent. An analysis of the concept and practice of development. Alternative people-centered approaches to social change are investigated.

321. *Advanced Fluvial Geomorphology*. I. 4 hr. PR: GEOL 221 or GEOG 221 or consent. Analysis of stream processes, landforms, deposits, including paleohydrology and Appalachian surficial geology. (Fall semester of odd numbered years; required weekend field trips at student's expense; also listed as GEOL 321.)

322. *Surficial and Glacial Geology*. I. 4 hr. PR: GEOL 221 or GEOG 221 or consent. Analysis of late Cenozoic landscapes, especially those caused by glaciers or otherwise influenced by global climate change. (Fall semester of even-numbered years; required weekend field trips at student's expense; also listed as GEOL 322.)

325. *Planning Theory and Process* (Alternate years). 3 hr. PR: GEOG 225 or consent. A survey of the historical development of planning theory, the various roles planners play in practice, and the ethical dilemmas they face.

329. *Problems in Geomorphology*. I, II. 1-4 hr. (Also listed as GEOL 329.)

351. *GIS Technical Issues*.. 3 hr. PR: GEOG 250. Current issues in GIS research. Technical aspects of GIS operations, algorithms, theory of geographical data structures, and error handling. Labs focus on tools, data structures, database languages, and macros. 2 hr. lec., 1 hr. lab.

399. *Advanced Research Methods*. 3 hr. PR: GEOG 301 and consent. Review of quantitative and qualitative methods used in geographic research.

411. *Regional Development*. (Alternate years.) 3 hr. PR: Consent. Review of contemporary geographic theories of uneven spatial development of capitalism.

420. *Resource Geography Seminar*. (Alternate years.) 3 hr. PR: Consent. Survey of the geographical literature on natural resource management and nature-society theory.

452. *Advanced GIS*. I. 3 hr. PR: GEOG 252 or GEOG 351, or consent. Functional strengths and weaknesses of GIS. Related geographical information science technologies, GPS, remote sensing, multimedia, spatial statistics, and expert systems. Multidimensionality (4-D GIS), temporality, social implications of GIS.

455. *Advanced Remote Sensing*. II. 3 hr. PR: GEOG 255, GEOL 255, or consent. Collection, processing, and classification of remotely sensed data, including optical, thermal, radar, and topographic information. 2 hr. lec., 1 hr. lab. (Also listed as GEOL 455.)

489. *Geography Graduate Student Internship*. I, II, S. 1-6 hr. PR: Consent. Internship in the private or public sector designed for practical application of geographic training.

Geology

Trevor Harris, Chairperson of the Department of Geology and Geography

Thomas Kammer, Associate Chairperson for Geology

425 White Hall

Degrees Offered: Master of Science, Doctor of Philosophy

The graduate program in geology at WVU provides study opportunities in the following areas:

- Hydrogeology and Environmental Geology, with strengths in flow and contaminant-transport modeling, mine reclamation, floods and debris flows, landfill siting and monitoring;
- Basin Analysis, with strengths in seismic modeling, basin structures, deposystem analysis, sequence stratigraphy, biostratigraphy, diagenesis, and plate tectonics; and
- Energy Geology, with strengths in the exploration and development of oil, gas, and coal.

Admission Procedures and Prerequisites

Applicants for graduate studies in geology must have as a minimum requirement a bachelor's degree and an overall grade-point average of at least 2.75. Acceptance by the Department of Geology and Geography is necessary before admission of any prospective student to the program. All candidates for a graduate degree in geology must submit scores in the general aptitude tests of the Graduate Record Examination. Applicants seeking admission and financial support for the fall semester should apply by February 15. For spring semester, apply by October 1. Write to the department for an application package.

Before being admitted to programs leading to the master of science or the doctor of philosophy, a student must pass an undergraduate review examination covering physical, historical and structural geology, sedimentation-stratigraphy and mineralogy. The examination is given from 7:00-9:30 p.m. on the third day of classes each semester.

Students seeking admission to the master's program or the Ph.D. program must complete the equivalents of all allied science and mathematics courses required for the B.S. in geology at WVU, plus the following geology courses: Geology 1, 2, 3, 4, 152, 184, 185, 261, and 266. Similar courses from other universities or relevant experiences may be substituted if approved by the departmental graduate curriculum committee. In some cases a requirement may be waived by the committee if the student can pass the undergraduate review examination for that subject area.

GPA Requirements

A minimum grade-point average of 3.0 must be maintained in required formal courses in geology and cognate fields for the master's degree and 3.3 for the Ph.D. Loads of 9-12 hours are required and no withdrawals are permitted after the first two weeks of a semester. A student who fails to maintain the required average at the completion of any semester during the graduate program will be allowed one academic year (two semesters) to attain the required average. Failure to attain this average by the end of the probationary period will permanently eliminate the student as a candidate for a graduate degree in this department.

Master of Science

Emphasis Areas Students are required to take certain courses specified by their advisory committee. Students in the research option must take at least one course in each of three different areas in geology. Students in the Professional Studies option must take at least five courses from a minimum of three different topic areas. The five topic areas, with the relevant courses, are as follows:

- Stratigraphy/Sedimentation/Paleontology: GEOL 332, 341, 346;
- Structure/Tectonics. GEOL 351, 354, 357;
- Petrology. GEOL 385, 394;
- Geophysics/Quantitative Methods/GIS/Remote Sensing. GEOL 252, 352, 353, 399, and GEOG 251, 252, and 355;
- Hydrogeology/Geomorphology. GEOL 321, 322, 362, 364, 365, 395.

Approved graduate courses in biology, chemistry, physics, computer science, mathematics, engineering, soil sciences, or law may be taken as outside courses by geology graduate students. Students are free to take as many courses as they choose outside the department as long as they satisfy the emphasis areas requirements.

No later than the beginning of the second semester in residence, the prospective candidate must choose one of the options leading to the master of science (M.S.) degree in geology.

Research Option This has been the traditional option for the master of science in geology. Students considering continued studies (doctor of philosophy) should choose this option. A minimum of 24 formal course hours or seeking employment in an area of geological research and six research hours are required for graduation. A thesis based on original research also is required. With consent of the candidate's advisory committee, the field work need not be done while in residence at WVU.

Required to graduate: 30 hours, including certain required courses specified by the advisor.

Professional Studies Option This option is designed specifically for students seeking experience in preparing and presenting professional problems. Students choosing this option would be seeking employment in technical fields rather than continuing studies for a higher degree. A minimum of 34 formal-course hours and 8 problems hours (GEOL 392) are required for graduation. The problems hours are in lieu of a thesis and are designed to simulate the work of professional geologists as they seek solutions to open-ended problems. Experience in presentation of problems and solutions is an integral part of the program. Problems credits may be earned in conjunction with off-campus experiences by consent of the candidate's advisory committee. **Required to graduate: 42 hours, including certain required courses specified by the advisor.**

Doctor of Philosophy

Program The candidate for the doctor of philosophy must complete a program of courses outlined by the candidate's doctoral committee. Reading competence in a foreign language is required. Written and oral comprehensive examinations must be successfully completed. Work on original research is to be presented in a dissertation and defended in an oral examination. Graduate seminar is required.

Cooperative Projects

The National Research Center for Coal and Energy is located on the WVU campus. Research funding for graduate students is obtained by graduate faculty through the NRCCE's National Mine Land Reclamation Center and Water Research Institute. Close cooperation between the West Virginia Geological and Economic Survey, located on Cheat Lake near Morgantown, and the Department of Geology and Geography makes a large amount of material available for laboratory investigation, including the fossil collections of the department and the survey. A large number of samples of drill cuttings from deep wells in West Virginia and adjoining states are housed in the survey. Complete analytical geochemical equipment is available through a University analytical laboratory available to the department. The department also has a number of cooperative projects

with the Morgantown Energy Technology Center of the U.S. Department of Energy. Morgantown is conveniently situated for detailed studies of Mississippian, Pennsylvanian, and Permian formations. Mineral products of the region near Morgantown include coal, petroleum, natural gas, and limestone. The occurrence and utilization of these materials can be studied by graduate students interested in economic geology.

Equipment and Facilities

Department geophysical equipment includes a Geometrics magnetometer, a Worden gravimeter, an engineering seismograph, and a three-component short period seismograph. A permanent summer field camp (Camp Wood) is located in the folded Appalachians at Alvon (Greenbrier County), West Virginia, although its basic field course also includes mapping of metamorphic and igneous rocks along the Maine sea coast.

The geology program includes an annual trip to the Florida Keys and glacial geology studies in Maine. Additional oceanography courses and research are available at the Marine Science Consortium at Wallops Island, Virginia, with which WVU is affiliated.

Research and Teaching Computer Resources

The department's computing facilities are centered around an Open VMS Cluster providing a local area network with a fiber optic link to the Internet. The cluster is comprised of three main machines: a VAX 4000, a MicroVAX 3900, and a VaxStation 3500 with attached Sky Warrior array processor. In addition, A VaxStation 3100 and a Dec Alpha 3400 complete the cluster. The cluster contains nine gigs of on-line storage and services printers, plotters, and PCs throughout the department.

A recently renovated computer lab provides seating for 26 people with access to Intel 486/66 and Pentium-based personal computers. Teaching and research facilities offer numerous printers and plotters, including high-speed laser printers, a Tektronix color plotter, Versatec and Benson black and white electrostatic plotters, and a Calcomp electrostatic plotter.

The department is making a transition from an Open VMS cluster to a client server network centered around an AlphaServer 2100 4/200 with 128 megs of RAM, a Dec Alpha 3400 Workstation, an HP Apollo 9000/720 Workstation, and a DecStation 5400. Future modifications to the computing facilities include acquisition of a Windows NT server and a multimedia lab.

Computer Software Resources

The department maintains several software packages that are available for both instructional and research usage. Statistical packages such as SAS, Minitab, and NTSYS allow students to undertake detailed statistical analysis. Surface III, Mapping Contour System, and other mapping software enable users to contour and compare 2D surfaces. Geographic Information System (GIS) software, including ARC-INFO, IDRISI, GRASS, and SPANS, is accessible to students who want to integrate and compare complex geological and geophysical data. ERDAS IMAGINE provides a suite of image processing tools for analyzing remote sensed data. Dynamic Graphics Earth Vision software provides an interactive 3D visualization environment to assist interpretation of multidisciplinary data. AutoCAD and other computer-aided design packages are available to accurately draw surfaces and diagrams.

State-of-the-art geophysical modeling and processing software are also available for instructional and research use. GX Technologies' Advanced Interpretive Modeling System, and Landmark Geophysical's MIRA software help in the analysis of reflection seismic data. Seismic processing capabilities are present in the form of numerous internally developed software in addition to Western Geographical's Sierra Seis, and ICI's Eavesdropper processing software. Interpex Ltd.'s MAGIX package is used to undertake

both forward and inverse modeling of gravity and magnetic data. Interpex Ltd.'s RESIXIP and EMIX34 provide forward and inverse modeling capabilities for resistivity and terrain conductivity data.

Software for groundwater modeling falls into several categories. Emphasis is placed on using state-of-practice commercial packages whenever appropriate, to enhance career development for both research and professional practice. Supported capabilities include aquifer characterization (AQTESOLV), finite-difference flow codes (MODFLOW), particle-tracking and pathline analysis codes (MODPATH, PATH3D), and solute-transport codes (HFLOW, SOLUTE). Both preprocessors (MODELCAD) and postprocessors (SURFER, Spyglass TRANSFORM) are available for visualization of modeling results. Software in a variety of levels of sophistication are employed so that instruction can be carried out at both undergraduate and advanced levels.

Geology (GEOL)

201. *Physical Geology for Teachers*. I, II. 3 hr. (Credit cannot be obtained for both GEOL 201 and GEOL 1 or 5.) PR: High school teaching certificate and consent. Composition and structure of earth and the geologic processes which shape its surface.

215. *Environmental Geology*. II. 3 hr. PR: GEOL 221 or concurrent registration or consent for non-geology majors. (Field trips and independent field project required.) Principles, practice, and case histories in application of earth science to environmental problems. Includes: water quality; landslides; subsidence; waste disposal; legal aspects; and geological aspects of land-use planning.

221. *Geomorphology*. II. 3 hr. PR: GEOL 1 or 5. (Optional field trip(s) at student's expense.) An examination of the physical processes which shape the surface of the earth, with emphasis on fluvial processes and environmental geomorphology.

231. *Paleontology*. I. 3 hr. PR: GEOL 3, 4, and STAT 101; or consent. (Required weekend field trip at student's expense.) Uses of paleontologic data in geology; biostratigraphy, paleoecology, evolution, extinction, and biogeography; lab emphasis on identification and utilization of marine invertebrate fossils.

252. *Environ and Expl Geophysics 1*. I. 3 hr. PR: PHYS 2 and either MATH 16 or GEOL 161. Basic theory, computer modeling, and use of gravitational, magnetic, resistivity, and electromagnetic methods in the evaluation of shallow targets of interest to environmental, hydrological, and hazardous waste site investigations.

255. *Introduction to Remote Sensing*. I. 3 hr. Theory, technology and applications of photointerpretation and digital image analysis of aerial photography and multispectral images. (2 hr lec., 1 hr lab.) (Also listed as GEOG 255.)

260. *Carbonate Sedimentation of the Florida Keys*. S. 2 hr. PR: GEOL 1, 2, and consent. (Transportation, room and board, boat charter, and other misc. costs at student's expense.) Field trip to the Florida Keys to study origin and development of coral reefs and related carbonate sediments.

261. *Stratigraphy and Sedimentation*. II. 3 hr. PR: GEOL 3, 4, 152, 185. (Required field trips at student's expense.) Study of sediments and sedimentary rocks with an emphasis on the analysis of facies.

263. *Physical Hydrogeology*. I. 3 hr. PR: GEOL 1, MATH 3, or consent. Principles of groundwater hydrology, emphasizing the occurrence and movement of groundwater. Topics include aquifer properties, flow net analysis, and hydraulic aquifer testing.
266. *Appalachian Geology Field Camp*. S. 6 hr. PR: GEOL 152, 185, 261, and consent. (Living expense in addition to tuition must be paid at time of registration.) Practical experience in detailed geological field procedures and mapping.
269. *Applied Hydrogeology Seminar*. I. 1 hr. A review of professional practices and opportunities in hydrogeology. Seminar talks by hydrological professionals from WVU, industry, and government agencies. Field trips to examine hydrogeological practices and techniques.
270. *Mineral Resources*. II. 3 hr. PR: GEOL 1, 184. Description, mode of occurrence, and principles governing the formation of ore deposits.
272. *Petroleum Geology*. II. 3 hr. PR: GEOL 151 or 152. Origin, geologic distribution, methods of exploration and exploitation, uses and future reserves of petroleum and natural gas in the world. (Offered in spring of odd years.)
273. *Petroleum Geology Laboratory*. II. 1 hr. PR or Conc.: GEOL 152. Well sample description, correlation, and interpretation. Construction and interpretation of subsurface maps used in exploration for hydrocarbons. (Offered in spring of odd years.)
294. *Geochemical Systems*. II. 3 hr. PR: CHEM 16. Basic review of physical and aqueous chemistry, discussion of basic geochemical processes; calcium carbonate chemistry, diagenetic processes, weathering, the silicate and iron system.
321. *Advanced Fluvial Geomorphology*. I. 4 hr. PR: GEOL 221 or GEOG 221 or consent. Analysis of stream processes, landforms, deposits, including paleohydrology and Appalachian surficial geology. (Fall semester of odd-numbered years.) (Required weekend field trips at student's expense; also listed as GEOG 321.)
322. *Surficial and Glacial Geology*. I. 4 hr. PR: GEOL 221 or GEOG 221 or consent. Analysis of late Cenozoic landscapes, especially those caused by glaciers or otherwise influenced by global climate change. (Fall semester of even-numbered years.) (Required weekend field trips at student's expense; also listed as GEOG 322.)
329. *Problems in Geomorphology*. I, II. 1-4 hr.
332. *Paleoecology*. II. 3 hr. PR: GEOL 231 and 261 or consent. Methods of paleoecologic analysis in sedimentary geology. Topics include trace fossil analysis, shell biogeochemistry, community paleoecology, biofacies analysis of basins, and Precambrian paleoecology.
341. *Carbonate Sedimentology*. I (Alternate years.) 4 hr. PR: GEOL 231, 261. Origin and distribution of modern marine carbonate sediments as models for interpretation of ancient limestone and dolomite facies.
345. *Stratigraphy of Porous Media*. I (Alternate years.) 3 hr. PR: GEOL 261. Advanced discussion of the deposition of clastic sediments, chemistry of carbonates, sequence stratigraphy, porosity development in sandstones and limestones, flow of oil through rock.

346. *Advanced Sedimentation*. I. 4 hr. PR: GEOL 261 or consent. (Required field trips at student's expense.) Origin of sedimentary rocks; principles involved in interpretation of ancient geography, climates, animals, and plants. Emphasis on detrital sediments and rocks.

351. *Tectonics*. II. 3 hr. PR: GEOL 152 and 261; undergraduates need consent. Investigation of patterns and processes of large-scale deformation mechanisms that shape earth. Focuses on the structural evolution and modeling process of various plate boundaries. (Offered in spring of even years.)

352. *Environ and Expl Geophysics 2*. I. 4 hr. PR: PHYS 2, and either MATH 16 or GEOL 161, or consent. Studies in applied geophysics with emphasis on the environmental applications of reflection and refraction seismology and ground penetrating radar. 3 hr. lec., 1 hr. computer lab.

354. *Structural Analysis and Synthesis*. II. 3 hr. PR: GEOL 152 and 261; undergraduates need consent. Field and literature studies into the development of structures. Emphasizes the use of physical and theoretical models to understand various mechanisms of deformation. (Offered in spring of odd years.)

357. *Basin Structures*. I. 4 hr. PR: GEOL 152, 261, or equiv. The origin, development, and distribution of basins and the structure found within basins throughout the world are studied. The distribution of energy-related minerals related to basins and structural accumulations is emphasized.

362. *Quantitative Hydrogeology*. II. 3 hr. PR: MATH 16, GEOL 263 or permission. Mathematical and computer analysis of groundwater flow. Aquifer systems. Radial-flow solutions. Well/aquifer test methods. Superposition, boundaries. Dispersive/advective transport.

364. *Environmental Hydrogeology*. II. 3 hr. PR: GEOL 1, 2, 263, or consent. (PR or Conc: GEOL 362.) Seminar reviewing groundwater occurrence, flow, quality, and exploration in various geologic terrains; groundwater pollution and dewatering; and ground water technology. Includes topical literature review.

365. *Groundwater Modeling*. I. 4 hr. PR: GEOL 362 or consent. Theory and application of groundwater flow modeling, focusing on MODFLOW. Numerical methods. Discretization and boundaries. Parameterization and calibration. Problems and case histories.

366. *Karst Geology*. I. 3 hr. PR: Consent. Review of karst terrain hydrogeology and geomorphology, emphasizing origins and nature of caves, sinkholes and other karst landforms, environmental problems of karst, and its water and mineral/petroleum resources.

385. *Optical Mineralogy and Petrology*. II. 3 hr. PR: GEOL 185. Introduction to the optical properties of minerals and the use of the petrographic microscope. Interpretation of sedimentary, igneous, and metamorphic rocks based on microscopic examination of thin sections. (Offered alternate years.)

392. *Non-Thesis Research*. I, II, S. 1-12 hr. PR: Consent. Supervised non-thesis research for M.S. Option 2. Report required by arranged deadline.

394. *Physical Geochemistry*. I. 3 hr. PR: GEOL 1, 185; CHEM 16. Introduction to thermodynamics and its application to geologic systems. Equilibrium calculations involving pure phases and solutions in the gaseous, liquid, and solid states. (Offered in fall of even years.)

395. *Aqueous Geochemistry*. II. 3 hr. PR: GEOL 1, CHEM 12 or 16, or consent. Review of basic chemical principles as they apply to aqueous geochemical environments. Properties of water and the types, sources, and controls of the common and environmentally significant chemical species dissolved in water.

397. *Research*. I, II, S. 1-15 hr. PR: Consent. Research activities leading to a Master's thesis in Option 1.

399. *Quantitative Methods in Geo-Sciences*. II. 3 hr. PR: STAT 212, 311, or consent. Brief review and introduction to multivariate quantitative techniques as applied to geology and geography.

455. *Advanced Remote Sensing*. II. 3 hr. PR: GEOG 255, GEOL 255, or consent. Collection, processing, and classification of remotely sensed data, including optical, thermal, radar, and topographic information. 2 hr. lec., 1 hr. lab. (Also listed as GEOG 455.)

496. *Graduate Seminar*. I, II. 1-6 hr.

497. *Dissertation Research*. I, II, S. 1-15 hr.

History

Barbara Howe, Chairperson of the Department
202 Woodburn Hall

Degrees Offered: Master of Arts, Doctor of Philosophy

The Department of History offers graduate courses in the history of the United States, Appalachia/Region, Europe, Africa, Asia, Latin America, and science and technology and in public history. Courses are designed to prepare students in historiography, research methods, and interpretation. Students can select concentrations leading to preparation for careers in teaching and scholarship and as specialists for various branches of government, business, and service. Students in the program are normally expected to pursue the degrees of master of arts or doctor of philosophy.

Master of Arts

Admission Students seeking admission to the master of arts program should have the equivalent of a bachelor's degree in history. Application requirements include transcripts (a minimum of a 3.0 average in history courses is expected), three letters of recommendation, statement of purpose, writing sample, and combined scores of 1500 on the Graduate Record Examination General Aptitude Test.

Requirements This program requires the completion of a minimum of 30 hours of course work with at least a 3.0 average and achievement of proficiency in one foreign language or a research skill (six hours) relevant to the student's program. All 30 hours may be in history, or students may select up to six hours outside of the department. The history course work shall include a well-defined core area (selected from the fields listed for

comprehensive examinations or approved by the graduate studies committee) of at least 12 hours, including one readings/research seminar sequence. In addition, students are expected to enroll continuously in HIST 499 *Department Colloquium* for at least two semesters. Credit for this course does not count towards the degree. Students are also required to complete a master's thesis. A maximum of six hours of credit for HIST 497 *Research* can be taken for writing the thesis and for fulfilling the 30-hour M.A. requirement. Candidates for the M.A. are required to pass a final oral examination on their core area of study and thesis.

Public History Program The department also offers a 36-hour M.A. with an emphasis in public history, intended to provide enhanced employment opportunities to graduate students interested in using their education in history in a profession such as historic preservation, contract history work, archives, or historic site administration. The public history program works closely with WVU's Institute for the History of Technology and Industrial Archaeology. This is the only complete public history graduate curriculum in West Virginia.

Students apply for admission as they would for the regular M.A. program and should indicate on their application that they are interested in public history. In addition, students should submit a two-page letter of application, which should indicate the student's background in history or public history and why the student wants to be admitted to the history program; this letter should be addressed to the director of graduate studies of the Department of History. Students may be admitted to graduate study who do not have an undergraduate major in history by making up deficiencies in their course work for undergraduate credit; these courses may be taken while the students are enrolled for graduate classes or students may be able to test out of some courses.

The public history emphasis consists of 15 hours of public history courses (introduction to public history, two methods courses, and a six-hour supervised internship). Some courses may be taken outside the Department of History. Public history students are not required to meet the foreign language/research skill requirement. Students are required to take a 300-400 level readings/research seminar sequence in one subject area in the Department of History outside public history. Course descriptions, syllabi, policies and procedures, and a list of internship possibilities are available at the Department of History on request by contacting the coordinator of the public history program.

Doctor of Philosophy

Program Students seeking admission to the doctor of philosophy program should have the equivalent of a M.A. in history. Application requirements include a transcript (a minimum of a 3.0 average in graduate history courses is required), three letters of recommendation, and combined scores of 1500 on the Graduate Record Examination General Aptitude Test. Students should also include a statement of purpose and an example of their written work as a part of the application.

Requirements Requirements for the Ph.D. degree in history include the general WVU requirements; achievement of proficiency in one foreign language or "research skill" with a second language or skill at the discretion of the department; completion of two readings/seminar sequences beyond those offered for the M.A.; continuous enrollment in HIST 499 *Department Colloquium* for all full-time students (part-time students must attend for at least four semesters); passing the Ph.D. comprehensive examination of two parts (oral and written) administered by a committee of faculty members (normally at the end of a full-time student's second year of study); preparation of an acceptable dissertation based on original investigation; and successful defense of the dissertation in a final examination.

Fields of Study A candidate must offer a program of study in four fields, at least three of which must be in history; the other may be in a related field approved by the department. Doctoral students must maintain a 3.0 grade point average to remain in good standing. Fields available in the department include but are not limited to Europe, United States, Africa, East Asia, Latin America, Appalachia/regional, and science and technology. At least one field must be in a geographic area outside the major field of concentration for dissertation work.

Dissertation Dissertation work should normally be in United States history, twentieth-century Europe, European social history, Appalachia/regional, science and technology, or modern Africa. Students working in these areas, either at the M.A. or Ph.D. level, have the opportunity to study with adjunct professors and faculty from other departments and universities.

History (HIST)

200. *Greece and Rome*. 3 hr. Covers the Minoan and Mycenaean civilizations, Archaic and Classical Greece, Alexander the Great and the Hellenistic Age, the Roman Republic, and Etruscan and Carthaginian states, and the rise of the Roman Empire.

201. *Social and Economic History of the Middle Ages, 300-1000*. 3 hr. (HIST 103 is recommended as preparation.) Topics include the social-economic crisis of the late Roman and German institutions, the Merovingian and Carolingian economics, Pierenne Thesis, and transition to feudal society.

204. *Ancient and Medieval Science*. 3 hr. Investigations of the natural world in classical antiquity and medieval Europe.

205. *The Renaissance*. 3 hr. The underlying political, economic, and social structure of fourteenth- and fifteenth-century Italy with concentration on significant intellectual and cultural trends, including humanism and art, gender roles, state formation, and exploration.

206. *The Reformation*. 3 hr. Religious change in sixteenth-century Europe focusing on distinguishing theological characteristics of major reformers, the response of the people to these religious changes, and the impact on European politics and society.

207. *The Rise of Modern Science*. 3 hr. The emergence of the scientific world view from the Renaissance through the Enlightenment.

208. *Science in Modern Europe*. 3 hr. Crystallization and generalization of scientific world view in Europe after the Scientific Revolution. Emphasizes the mutual interaction of science, society, and culture.

209. *Brazil: Colony to World Power*. 3 hr. Examines the transition of Brazil from a colony to a world power, with special emphasis on recent economic developments, regional diversity, political patterns, foreign affairs, and race relations.

210. *Modern Spain*. 3 hr. Survey of the Moslem, Hapsburg, and Bourbon periods followed by an examination of modern political and social forces, the Civil War, and the rule of Franco.

211. *Industrial Revolut'n 1600-1900*. 3 hr. Focuses on technical, economic, and social changes surrounding the Industrial Revolution in England and the United States. Examines also the expanding effects of the process of industrialization in Continental Europe.

212. *Introduction to Public History*. 3 hr. Introduction to a wide range of career possibilities for historians in areas such as archives, historical societies, editing projects, museums, business, libraries, and historic preservation. Lectures, guest speakers, field trips, individual projects.

213. *France—Renaissance to Napoleon*. 3 hr. French history from the end of the Hundred Years War to Napoleon's defeat at Waterloo. Focus on the construction of the modern French state, the Enlightenment, the French Revolution, and Napoleon.

214. *France since 1815*. 3 hr. French history from the restoration of the Bourbon monarchy to the present. Will emphasize the development of a modern industrial society, the revolutions of the nineteenth century, the impact of the World Wars, and France's role in the new Europe.

215. *European Diplomatic History, 1815 to 1919*. 3 hr. Develops an understanding of the forces, men, and events which determined diplomatic relations between the major powers.

216. *European Diplomatic History, 1919 to Present*. 3 hr. Scope similar to HIST 215.

217. *World War II in Europe*. 3 hr. Impact of World War II on the political culture and moral fabric of European societies; emphasis on themes of invasion, occupation, collaboration, resistance, survival, and retribution.

219. *Revolutionary Russia, 1905-1939*. 3 hr. Detailed study of the revolutionary era of Russian/Soviet history with emphasis on the origins of Russian radicalism, the upheavals of 1905 and 1917, and Stalin's "revolution from above."

220. *The U.S.S.R., 1939 to Present*. 3 hr. Detailed study of the recent social and political history of the Soviet Union. The Soviet experience in World War II, Stalin's last years, and the conflict between reformism and conservatism since Stalin's death.

221. *Hitler and the Third Reich*. 3 hr. PR: Junior, senior, or graduate standing. Myths and realities of Hitler's public and personal life; emphasis on rise to power, party, ideology, and propaganda techniques; position and policies as fuehrer.

222. *Modern Germany since 1900*. 3 hr. The Weimar Republic, the Third Reich, and the two German states created after World War II.

225. *History of Modern China*. 3 hr. Introduction to modern China (since 1839) with attention to China's Confucian heritage; examines in detail the Chinese effort to modernize in the face of Western diplomatic and economic pressure; specific attention to China's Nationalist and Communist revolutionary traditions.

226. *History of Modern Japan*. 3 hr. Modern Japan (since 1868) with attention to the development of Japanese institutions and ideas in earlier periods, especially the Tokugawa Era (1600-1868); examines the rapid pace of economic change in the nineteenth and twentieth centuries along with the important social, political, and diplomatic implications of this change.

227. *East Africa to 1895*. 3 hr. East Africa from earliest times to beginning of European control. Population movement and interaction, development of varying types of polity, revolutionary changes, and the European scramble for East Africa form the major focus.

228. *East Africa since 1895*. 3 hr. History of colonial rule and movement to independence in East Africa. Political, economic, and social changes will be examined with particular emphasis on the rise and triumph of African nationalism.

229. *History of Africa: Pre-Colonial*. 3 hr. History of Africa from earliest times to the middle of the nineteenth century. Particular emphasis on population movement and interaction, state formation, and the development of trade in sub-Saharan Africa as well as the impact of such external influences as Christianity and Islam.

230. *History of Africa: Colonial*. 3 hr. History of Africa from the middle of the nineteenth century to the 1960s. Political and economic trends will form major focus.

231. *Seventeenth-Century Britain, 1603-1715*. 3 hr. The more significant political, social, economic, religious, and intellectual developments of Britain during a century of revolution and of the men and women who interacted with those movements.

232. *Eighteenth-Century Britain, 1715-1832*. 3 hr. The Age of Aristocracy, the political, social, religious, economic, and intellectual forces which produced it, and the reasons for its decline under the combined impact of the Industrial, Agricultural, American, and French revolutions.

245. *History of American Women*. 3 hr. Examination of the history of American women from 1607 to the present, with emphasis on working conditions, women's rights, development of feminism, women's role in wartime, and women in the family.

246. *Hist European Women to 1700*. 3 hr. History of European women to 1700, emphasizing philosophic, economic, and societal sources of women's oppression, women's self-perceptions and their roles in work, religion, and the family and the development of feminism.

251. *African-Amer Hist to 1900*. 3 hr. Slave trade and evolution of slavery in the New World, the attack upon slavery and its destruction, the South and the blacks during Reconstruction, and the age of Reaction and Racism, 1875-1900.

252. *African-Amer Hist since 1900*. 3 hr. Reconstruction, the age reaction and racism, black migration, black nationalism, blacks in the world wars, and desegregation.

253. *Civil War and Reconstruction*. 3 hr. Causes as well as the constitutional and diplomatic aspects of the Civil War; the role of the American black in slavery, in war, and in freedom; and the economic and political aspects of Congressional Reconstruction.

255. *Gilded Age in US History*. 3 hr. Examines responses of the American people and institutions to opportunities and problems of the late nineteenth century. Emphasis on rise of big business; labor organization; immigration; regular, reform, and radical politics; disappearance of the frontier; farm crisis; and origins of imperialism.

257. *US From McKinley to New Deal, 1896-1933*. 3 hr. American national history from William McKinley to Franklin D. Roosevelt. Particular attention is given to the great changes in American life after 1896; national, political, economic, social, and cultural development; the Progressive Era in American politics; and alterations in American foreign relations resulting from the Spanish-American War and World War I.

259. *US Hist New Deal-Great Society*. 3 hr. Covers New Deal, World War II; Cold War, with emphasis on American social, political, technological, and cultural developments; United States domestic problems and foreign relations from 1945 to 1968.

263. *American Diplomacy to 1941*. 3 hr. PR: None; HIST 52 and 53 recommended. American foreign policy and diplomacy from the adoption of the Constitution to America's entry into World War II.

264. *American Diplomacy since 1941*. 3 hr. PR: None; HIST 52 and 53 recommended. America's foreign policy and growing involvement in international relations including the U.S. role in World War II, Korean War, and Vietnam.

266. *American Economic History to 1865*. 3 hr. Origins and development of American business, agricultural, and labor institutions; problems, and policies, from 1600 to 1865; influence of economic factors upon American history during this period.

267. *American Economic History Since 1865*. 3 hr. Scope similar to that stated for HIST 266.

268. *The Old South*. 3 hr. (For advanced undergraduate and graduate students.) History of the South—exploring peculiar differences that led to an attempt to establish a separate nation. The geographical limitation permits a detailed study of economic and social forces within the context of the larger national history.

269. *The New South*. 3 hr. Integration of the South into the nation after the Civil War. Emphasis on southern attitudes toward industrialization, commercial agriculture, organized labor, and the African-Americans. Special attention to the southern literary renaissance and conservative and progressive politics of the southern people.

273. *Appalachian Regional History*. 3 hr. Historical survey of Central Appalachia's three phases of development: traditional society of the nineteenth century, the transformation of a mountain society by industrialization at the turn of the twentieth century, and contemporary Appalachia.

274. *The City in American History*. 3 hr. A survey of urban history in the United States, including the Colonial period, with emphasis on the nineteenth and twentieth centuries, focusing on physical development of cities (planning, transportation, architecture, suburbanization) and social history.

289. *Intro to Historic Preservation*. 3 hr. Introduction to historic preservation issues, including law, economics, not-for-profit organizations, site interpretation, architectural history, industrial archeology, federal programs, downtown revitalization, and landmarks commissions.

290. *Introduction to Historical Research*. 3 hr. (Required for History majors; non-majors by consent.) Introduction to research techniques useful for history. Instruction in locating sources, taking notes, and writing research papers.

301. *Readings in Medieval History*. 3 hr. Examination of the literature, biography, sources, and research methods on selected problems in medieval history, using discussion and written reports on assigned readings. May be repeated once.

305. *Readings in English History*. 3 hr. Directed readings of scholarly books and articles, primarily in the history of England from about 1450 to about 1625 but with some opportunity for the student to fill gaps in the student's knowledge of other periods of English history. May be repeated once.

309. *Rdgs Central European History*. 3 hr. All students will read and discuss selected works illustrating outstanding scholarship or interpretative problems related to fifteenth-, sixteenth-, and early seventeenth-century history. In addition, opportunity will be provided for each student to pursue an independent reading project tailored to the student's special interests. May be repeated once.

310. *Historic Site Interpretation and Preservation*. 3 hr. PR: HIST 212. Introduction to historic site interpretation and preservation, including establishing criteria, site inventory, and recording techniques using the "case study" method. Lectures, films, discussions, and field projects will introduce students to the rapidly growing area, including environmental impact work.

311. *Archival Management*. 3 hr. PR: HIST 212. Principles and practices of archival work within a laboratory context. Includes lectures and selected readings illustrated by holdings and policies of West Virginia and Regional History Collection of the WVU Library.

312. *Practicum in Historical Editing*. 3 hr. PR: HIST 212. Principles and practices of historical editing in a laboratory context. Includes lectures and readings with illustrations from ongoing editing projects.

313. *Local History Research Methods*. 3 hr. Emphasis on research methods applicable to any locality; includes legal records, oral records, secondary sources, photographs, maps, and government documents.

314. *Rdgs Eastern European History*. 3 hr. Intensive readings on specific topics in Russian, Soviet, or East European history. Students should normally have had History 117 and 118 or their equivalents. Primarily designed for graduate students and selected undergraduates. May be repeated once.

317. *Rdgs Western European History*. 3 hr. This course, primarily for graduate students and selected undergraduates, is designed for an intensive reading program on special problems in western European history. May be repeated once.

321. *Readings in Asian History*. 3 hr. Intensive readings in the history of East Asia (especially China and Japan) since the nineteenth century; students should normally have had HIST 225 and 226, or their equivalents; reviews, as well as bibliographical and historiographical essays, required. May be repeated once.

325. *Readings in African History*. 3 hr. This course will normally focus on readings and discussion on problems in the history of pre-colonial Africa, the major works in African history, and recent interpretations in the field. May be repeated once.

330. *Rdgs in Latin American History*. 3 hr. PR: Graduate status. Critical examination of selected sources and topics for understanding and interpreting Latin American history. May be repeated once.

331. *Rdgs American History, 1585-1763*. 3 hr. Supervised readings and reports designed to prepare students for intensive study in a seminar or for field examinations in colonial American history. May be repeated once.

345. *Rdgs in American Labor History*. 3 hr. PR: Consent. Readings seminar designed to provide a broad knowledge of American labor and working class history by focusing on conceptual issues and methods of research that have shaped the development of this field. May be repeated once.

355. *Rdgs Amer Hist 1763-1800*. 3 hr. Readings and reports designed to prepare students for an intensive study in a seminar or field examination. May be repeated once.

359. *Rdgs US Hist 1840-1898*. 3 hr. Survey of interpretive literature on Sectionalism, Civil War, Reconstruction, and Gilded Age. Assignments are both oral and written reports on assigned readings and a critical essay on some aspect of American historiography for this period. May be repeated once.

363. *Rdgs in US History, 1898 to Present*. 3 hr. Readings and class-led discussion of one paperback book per week and preparation of a paper based on these books and the class discussion of them. May be repeated once.

373. *Rdgs Appalachian Regional Hist*. 3 hr. A course for graduate students and seniors in the history of West Virginia and neighboring states, which form what is known as the Trans-Allegheny or Upper Ohio region. May be repeated once.

375. *Rdgs in Science and Technology*. 3 hr. Examination of the literature, bibliography, and sources on selected topics in the history of science and technology. Class discussions and written reports on assigned topics. May be repeated once.

382. *Rdgs Social History of US*. 3 hr. The objective of the course is to establish for graduate students usable frames of reference for selected topics in social history by examining the ways in which historians have written about these topics. May be repeated once.

391. *Advanced Topics*. I, II, S. Variable 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

397. *Master's Degree Research or Thesis*. I, II, S. Variable 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

402. *Seminar in Medieval History*. 3 hr. PR: HIST 301; reading knowledge of Latin and a modern European language strongly recommended. Directed examination of bibliographic sources and historiographical issues on selected aspects of the Middle Ages, leading to preparation of a research paper based on primary sources. May be repeated once.

410. *Sem Central European Hist*. 3 hr. An intensive survey of the bibliographical aids and printed source materials available in the field. A research paper and a bibliographical essay will be presented by each student. Reading knowledge of German and French strongly recommended. May be repeated once.

411. *Internship in Public History*. 6 hr. PR: HIST 212 and two intermediate public history courses. A professional internship at an agency involved in a relevant area of public history. Supervision will be exercised by both the Department of History and the host agency. Research report or finished professional project required.
414. *Sem Eastern European Hist*. 3 hr. PR: HIST 117, 118 or equiv. Research seminar on selected topics in Russian, Soviet, or Eastern European history. One major paper and extensive reading based on available source materials is required. May be repeated once.
418. *Sem Western European History*. 3 hr. A research seminar in selected topics in western European history. One major paper and extensive reading based on available source material is required. A reading knowledge of the appropriate languages is required, if applicable. May be repeated once.
422. *Seminar in Asian Hist*. 3 hr. Advanced readings and research in East Asian history; specific emphasis on research tools and techniques; research paper based on English-language sources required; students should normally have had HIST 225 and 226 or their equivalents. May be repeated once.
426. *Seminar in African History*. 3 hr. The seminar will normally focus on eastern Africa in the colonial period. Location and use of source materials will be emphasized as well as economic and political developments. Students will spend considerable time in research and writing on selected aspects of eastern African history. May be repeated once.
432. *Sem American History. 1585-1763*. 3 hr. PR: HIST 331 or consent. Directed research on colonial American history, using original and secondary materials. May be repeated once.
441. *Sem in Latin American History*. 3 hr. PR: Consent. Survey of Latin American historiography, location and use of primary source materials, discussion of research techniques, and the writing of a research paper. Reading knowledge of Spanish, Portuguese, or French will be helpful. May be repeated once.
456. *Sem American History. 1763-1830*. 3 hr. PR: HIST 355 or consent. Advanced readings and research in revolutionary and early national American history. May be repeated once.
460. *Sem US Hist 1850-1898*. 3 hr. Directed research in mid- and late 19th-century American history, including guidance in methods of research and manuscript preparation. May be repeated once.
464. *Sem US Hist, 1898-Present*. 3 hr. Directed research in recent American history including guidance in method of research and manuscript preparation. May be repeated once.
474. *Sem Appalachian Regional Hist*. 3 hr. A seminar for graduate students in the history of West Virginia and neighboring states, which form what is known as the Trans-Allegheny or Upper Ohio region. May be repeated once.
476. *Sem Science and Technology*. 3 hr. PR: HIST 375 or consent. Research seminar in the history of science and technology. Discussion of methods and sources; presentation and critique of research papers based on primary sources. May be repeated once.

489. *Folger Institute Seminar*. 3 hr. PR: Graduate standing. (Enrollment is by special application only. Contact department chairperson for information.) Seminar conducted by distinguished scholars and held at the Folger Institute of Renaissance and Eighteenth Century Studies in Washington, D.C. Topics vary. (Also listed as ENGL 493.)

490. *Teaching Practicum*. 1-3 hr. PR: Consent. Supervised practices in college teaching of history. (Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibilities.)

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

492. *Directed Study*. I, II, S. 1-6 hr. Directed study, reading, and/or research.

493. *Special Topics*. I, II, S. 1-6 hr. A study of contemporary topics selected from recent developments in the field.

494. *Special Seminars*. I, II, S. 1-6 hr. Special seminars arranged for advanced graduate students.

495. *Independent Study*. I, II, S. 1-6 hr. Faculty supervised study of topics not available through regular course offerings.

497. *Research*. 1-15 hr. PR: Consent.

499. *Graduate Colloquium*. 1 hr. PR: Consent. Graduate students in residence must register for the colloquium. Students are expected to enroll continuously for at least two semesters. Credit for this course does not count towards degree requirements.

Liberal Studies

Richard Montgomery, Director
252 Stansbury Hall

Degree Offered: Master of Arts in Liberal Studies

This interdisciplinary program provides an opportunity for highly motivated students to continue their studies beyond the baccalaureate under a coherent program but without the exclusive concentration in one discipline. Studies for this degree should focus primarily on theoretical issues in the liberal arts disciplines such as humanities (English, history, philosophy, religious studies, and foreign languages), the fine arts, or the social sciences.

Curriculum

Each student, in conjunction with a graduate advisor, will put together a personalized curriculum centered around some topic or interdisciplinary area of special interest. Topics might include area studies such as Appalachian studies or French culture; period studies such as the Renaissance or the Enlightenment; or some other area of special interest, such as women's studies, that will tie together work in several different disciplines. The central theme is essential to the degree program to provide coherence and structure; a degree will not be awarded for an unrelated collection of courses. The focus

provided by a central topic will ensure that studies are pursued in depth, and justify the granting of a graduate degree.

Faculty

There are more than 750 graduate faculty members at WVU who can be called upon to assist students in their individual plans of study. The program is administered by the master of arts in liberal studies committee, which is appointed by the program director and is responsible for admitting candidates to the program, approving study contracts, overseeing the final evaluation, and determining whether degree requirements have been met. This committee serves roughly the same administrative function for the master of arts in liberal studies (M.A.L.S.) as an academic department serves for more traditional degree programs.

Admission

Requirements for admission to the M.A.L.S. program:

- Baccalaureate degree from an accredited institution.
- Minimum undergraduate grade-point average of 3.0. Probationary status may be granted for those who do not meet this standard but who exhibit clear potential for graduate work.
- GRE General Aptitude Test scores that clearly demonstrate the ability to do graduate work.
- Acceptance by the M.A.L.S. committee of a preliminary study plan for the degree.

Application

To apply for admission to the M.A.L.S. program, the student should simultaneously submit an application for graduate admission to the Office of Admissions and Records and submit an essay of approximately 1,000 words outlining the proposed plan of study to the M.A.L.S. committee. This plan must describe the central focus of the study in some detail and must include a preliminary identification of course work to be taken, along with an indication of how each course relates to the central topic.

The quality of the admissions essay is one of the primary criteria used by the M.A.L.S. committee in making admission decisions. Thus, the essay should be carefully thought out and clearly written; it should provide evidence of direction and motivation as well as mastery of the necessary writing skills. Another criterion for admission to the program is that the proposed plan of study can be carried out at WVU. The applicant should consult the course listings elsewhere in this catalog to determine whether the courses offered are adequate to the proposed study plan. In some cases, the necessary courses may not be available.

Advisory Committee

After admission to the M.A.L.S. program, the student will choose an advisor and a master's committee with the assistance of the M.A.L.S. committee. The advisor will then help the student to draw up a final version of the plan of study, which should include a description of the central, unifying theme, a (possibly revised) list of course work to be taken, with an indication of the relevance of the courses to the central topic, and a description of the final project.

Special Requirements

In addition to the general requirements listed in the graduate catalog for all graduate programs at WVU, the M.A.L.S. program has the following specific requirements:

- A minimum of 36 semester hours of approved course work, subject to the following restrictions: a. Because the degree is intended to be interdisciplinary no more than 18

hours can be taken in one departmental discipline; b. No more than 12 hours of independent study will be approved; c. The program must include at least three hours of course work in research methodology.

- A minimum 3.25 grade-point average for all course work in the degree program.
- Fulfillment of all requirements of the study contract.
- Successful completion of a final project (e.g., a comprehensive examination, research project, a performance project, or master's thesis).

Mathematics

Harvey R. Diamond, Interim Chairperson

370 Armstrong Hall

Degree Offered: Master of Science, Doctor of Philosophy

Master of Science

Programs are available for students to study applied mathematics, pure mathematics, mathematics combined with another discipline, or mathematics for secondary education. Entering students should have the equivalent of an undergraduate major in mathematics. To be in good standing, a student is expected to maintain at least a 3.0 average (B) in mathematics courses and to present at least a 3.0 average in all work offered in fulfillment of the degree program.

Advisory Committee Each student, upon beginning a graduate program, will be assigned an advisory committee consisting of at least three members of the graduate faculty. This committee will assist the student in designing a written plan of study that takes into account the student's interests and needs as well as the aims of the department's graduate programs. Later changes in the plan are possible only through mutual agreement of the student and the committee.

Programs The student's plan of study is developed in one of these programs: pure mathematics, mathematics for secondary educators, applied mathematics, and interdisciplinary. The programs are designed either for students who intend to pursue a doctor of philosophy in mathematics or for those planning to seek employment in education, government, or industry. Depending upon the program selected, 30 to 33 semester hours are required.

Note: Math 490 may not be counted for credit to satisfy graduate course hour requirements.

Completion Requirements A student with 18 or more hours of graduate study, who has completed the basic required courses with a cumulative average of at least 3.3, may petition the advisory committee to accept the successful completion of a project in lieu of the final examination. Otherwise, all four programs of study require a written final examination.

Doctor of Philosophy

The doctor of philosophy is a research program in which the final product is an original, publishable research thesis. The program requires students to take 28 hours of course work. Areas of focus include number theory, analysis, topology, applied mathematics, combinatorics, and graph theory.

Requirements

Applicants must have completed a graduate degree similar to the M.S. in mathematics outlined above. The following materials should be submitted:

- A WVU admission application
- An application for financial support
- Official undergraduate and graduate transcripts
- Three letters of recommendation from individuals having experience of an applicant's mathematical ability

- GRE scores for the general test and for the mathematics subject test

- TOEFL scores for students whose native language is not English.

All doctoral students must demonstrate that they are prepared to undertake doctoral work and research by passing an entrance examination, given each year in May and August, within the first year of study.

Twenty-eight hours of course work are required of all doctoral students. The distribution of these courses is as follows:

- Twelve hours at the 400 level in the student's major area.
- Six hours in each of two minor areas. With the approval of the director of graduate studies, up to one course in a minor area may be at the 300 level.
- Four hours of MATH 496 *Seminar*.

Computer Language Proficiency Proficiency in a computer language at the level of CS 301 or an approved equivalent is required. Reading proficiency in French, German, Russian, or another foreign language, which may be proved through a score of 465 or better on an examination given by Educational Testing Service, or through grades of A or B in a Foreign Language 306 course, is required.

Dissertation Committee After the above requirements are satisfied, a student must request that the director of graduate studies select a dissertation committee of at least five members, with a dissertation advisor as chairperson and one member from outside the department.

Examinations and Dissertation The student must pass a qualifying oral and written examination on the major and minor areas of study. If examination results are unsatisfactory, the dissertation committee may reexamine the student once.

A Ph.D. candidate must complete a dissertation, representing at least 24 hours of 400-level credit, under the supervision of a dissertation advisor. The research upon which the dissertation is based must conform to scholastic standards and constitute an original and publishable contribution to mathematics.

Mathematics (MATH)

213. *Partial Differential Equations*. II. 3 hr. PR: MATH 18 or consent. Introduces students in mathematics, engineering, and the sciences to methods of applied mathematics. First and second order equations, canonical forms, wave, heat and Laplace's equations, representation of solutions.

215. *Applied Modern Algebra*. I. 3 hr. PR: Consent. Finite fields, algebraic coding theory, Boolean algebras, monoids, finite state, and Turing machines.

217. *Applied Mathematical Analysis*. II. 3 hr. PR: MATH 18. The algebra and differential calculus of vectors, solution of the partial differential equations of mathematical physics, and application of functions of a complex variable.

219. *Seminar in Applied Mathematics*. I, II. 1-12 hr. PR: Consent. Selected topics in applied mathematics.

220. *Numerical Analysis 1*. I, II. 3 hr. PR: MATH 17 (or both MATH 16 and CS 120) and a programming language. Computer arithmetic, roots of equations, interpolation, Gaussian elimination, numerical integration and differentiation. Numerical solution of initial value problems for ordinary differential equations. Least square approximations. (Equiv. to CS 220.)

221. *Numerical Analysis 2*. II. 3 hr. PR: CS 220 or MATH 241 or consent. Solutions of linear systems by direct and iterative methods. Calculation of eigenvalues, eigenvectors, and inverses of matrices. Applications to ordinary and partial differential equations. (Equiv. to CS 221.)

224. *Mathematics of Compound Interest*. II. 3 hr. PR: MATH 16 or 128. A problem-solving course focusing on the measurement of interest, annuities, amortization schedules, and sinking funds, and the valuation of bonds and other securities.

228. *Discrete Mathematics 2*. II. 3 hr. PR: MATH 16 and 120 or equiv. Applications of discrete mathematics to computer science. Methods of solving homogeneous and non-homogeneous recurrence relations using generating functions and characteristic equations; digraphs to analyze computer algorithms; graph theory and its ramifications to computer algorithms. (Equiv. to CS 228.)

231,232. *Introduction to Mathematics for the Elementary Teacher*. I, II. 3 hr. per sem. PR: MATH 34 or consent. (Not open to students who have credit for MATH 131.) (For in-service elementary mathematics teachers.) Systems of numeration; sets, relations, binary operations, the algebraic structure of various number systems; the notions of length, area, and volume; coordinate geometry.

241. *Applied Linear Algebra*. I, II, S. 3 hr. PR: MATH 17; MATH 18 or consent. Matrix algebra with emphasis on algorithmic techniques and applications of physical models. Topics include solution of large systems of equations, orthogonal projections and least squares, and eigenvalue problems.

251,252. *Introduction to Real Analysis*. I, II. 3 hr. per sem. PR: MATH 163 or consent. A study of sequences, convergence, limits, continuity, definite integral, the derivative, differentials, functional dependence, multiple integrals, sequences and series of functions.

255. *Advanced Real Calculus*. S. 3 hr. MATH 18 or consent. Limits, series, metric spaces, uniformity, integrals.

256. *Complex Variables*. II. 3 hr. PR: MATH 18. Complex numbers, functions of a complex variable; analytic functions; the logarithm and related functions; power series; Laurent series and residues; conformal mapping and applications.

269. *Advanced Topics in Mathematics*. I, II, S. 3-9 hr. PR: Consent. An independent but directed study program, the content of which is to be mutually agreed upon by the individual student and instructor.

301,302. *Combinatorial Analysis*. I, II. 3 hr. per sem. PR: One year of calculus. Permutations, combinations, generating functions, principle of inclusion and exclusion, distributions, partitions, compositions, trees and networks.

305,306. *Theory of Numbers*. I, II. 3 hr. PR: One year of calculus. Introduction to classical number theory covering such topics as divisibility, the Euclidean algorithm, Diophantine equations, congruences, primitive roots, quadratic residues, number-theoretic functions, distribution of primes, irrationals, and combinatorial methods. Special numbers such as those of Bernoulli, Euler, and Stirling.

313. *Intermediate Differential Equations*. II. 3 hr. PR: MATH 17, 18. A rigorous study of ordinary differential equations including linear and nonlinear systems, self-adjoint eigenvalue problems, non-self-adjoint boundary-value problems, perturbation theory of autonomous systems, Poincare-theorem.

317,318. *Advanced Calculus*. I, II. 3 hr. per sem. PR: MATH 18. Primarily for engineers and scientists. Functions of several variables, partial differentiation, implicit functions, transformations; line surface and volume integrals; point set theory, continuity, integration, infinite series and convergence, power series, and improper integrals.

319. *Seminar in Applied Mathematics*. 1-12 hr. PR: Consent. Selected topics in applied mathematics. Topics previously offered include applied linear algebra, computational fluid dynamics, numerical partial differential equations, ordinary differential equations, perturbation methods, and stochastic processes.

320. *Solution of Nonlinear Systems*. II. 3 hr. PR: CS 220 or MATH 241 or consent. Solution of nonlinear systems of equations. Newton and Secant Methods. Unconstrained optimization. Nonlinear overrelaxation techniques. Nonlinear least squares problems. (Equiv. to CS 320.)

330. *Introduction to Applied Mathematics*. S. 1-6 hr. PR: Calculus or consent. (Designed especially for secondary-school mathematics teachers; others admitted with departmental approval obtained before registration.) Problem solving and construction of mathematical models in the social, life, and physical sciences. Examples illustrating the origins and use of secondary school mathematics in solving real world problems.

333. *Modern Algebra for Teachers*. I, S. 3 hr. PR: Calculus or consent. (Designed especially for secondary-school mathematics teachers. Others admitted with departmental approval obtained prior to registration.) Introduction to algebraic structures: groups, rings, integral domains and fields. Development and properties of the rational and real number systems.

334. *Modern Algebra for Teachers*. II, S. 3 hr. PR: MATH 141 or 333 or consent. Further investigation of algebraic structures begun in MATH 333. (Emphasis on topics helpful to secondary-school mathematics teachers.) Topics include Sylow theory, Jordan-Holder Theorem, rings and quotients, field extensions, Galois theory and solution by radicals.

335. *Foundations of Geometry*. S. 3 hr. PR: Calculus or consent. (Designed especially for secondary mathematics teachers; others admitted with departmental approval obtained before registration.) Incidence geometrics with models; order for lines and planes; separation by angles and by triangles; congruence; introduction to Euclidean geometry.

336. *Transformation Geometry*. S. 3 hr. PR: MATH 141 or 333 or consent. (Designed especially for secondary-school mathematics teachers; others admitted with departmental approval obtained before registration.) A modern approach to geometry based on transformations in a vector space setting. The course unifies the development of geometry with the methods of modern algebra.

339. *Special Topics*. I, II, S. 1-12 hr.

341,342. *Modern Algebra*. I, II. 3 hr. per sem. PR: MATH 141 or consent. Concepts from set theory and the equivalence of the Axiom of Choice. Zorn's Lemma and the Well-Ordering Theorem; a study of the structure of groups, rings, fields, and vector spaces; elementary factorization theory; extensions of ring and fields; modules and ideals; and lattices.

343. *Linear Algebra*. II, S. 3 hr. PR: MATH 241 or consent. Review of theory of groups and fields; linear vector spaces including the theory of duality; full linear group; bilinear and quadratic forms; and theory of isotropic and totally isotropic spaces.

351,352. *Theory of Functions of Real Variables*. I, II. 3 hr. per sem. PR: MATH 181, 252. A development of the Lebesgue integral, function spaces and Banach spaces, differentiation, complex measures, the Lebesgue-Radon-Nikodym theorem.

355,356. *Theory of Functions of Complex Variables*. I, II. 3 hr. per sem. PR: MATH 252. Number systems, the complex plane and its geometry. Holomorphic functions, power series, elementary functions, complex integration, representation theorems, the calculus of residues, analytic continuation and analytic function, elliptic functions, Holomorphic functions of several complex variables.

357. *Calculus of Variations*. II. 3 hr. PR: MATH 18, 252, (or 318). Necessary conditions and sufficient conditions for weak and strong relative minimums of an integral, Euler-Lagrange equation. Legendre condition, field construction, Weierstrass excess function, and the Jacobi equation.

381,382. *Topology*. I, II. 3 hr. per sem. PR: MATH 252 or consent. A detailed treatment of topological spaces covering the topics of continuity, convergence, compactness, and connectivity; product and identification space, function spaces, and the topology in Euclidean spaces.

400. *Seminar in Number Theory*. I, II. 1-12 hr.

402. *Special Functions*. I, II. 3 hr. PR: MATH 18, 252. Operational techniques, generalized hypergeometric functions, classical polynomials of Bell, Hermite, Legendre Noerlund, etc. Introduction to recent polynomial systems. Current research topics.

405,406. *Analytic Number Theory*. I, II. 3 hr. per sem. PR: MATH 306, 356. Selected topics in analytic number theory such as the prime number theorem, primes in an arithmetical progression, the Zeta function, the Goldbach conjecture.

451,452. *Functional Analysis*. I,II. 3 hr. per sem. PR: MATH 181, 241, 252. A study of Banach and Hilbert spaces; the Hahn-Banach theorem, uniform boundedness principle, and the open mapping theorem; dual spaces and the Riesz representation theorem; Banach algebras; and special theory.

457,458. *Theory of Partial Differential Equations*. I, II. 3 hr. per sem. PR: MATH 252. Cauchy-Kowaleski theorem, Cauchy's problem, the Dirichlet and Neumann problems, Dirichlet's principle, potential theory, integral equations, eigenvalue problems, numerical methods.

460. *Thesis*. I, II. 1-6 hr.

490. *Teaching Practicum*. I, II. 1-3 hr. PR: Consent. Supervised practices in college teaching of mathematics.

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

496. *Graduate Seminar*. I, II. 1 hr. PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of the student's program.

497. *Research*. 1-15 hr.

499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking course work credit but who wish to meet residence requirements, use the University's facilities, and participate in its academic and cultural programs.

Although philosophy has no graduate program, the following graduate courses are available.

Philosophy (PHIL)

230. *Philo and Cultural Criticism*. I. 3 hr. PR: 3 hr of philosophy at the 100 level or above, or consent. Recent philosophical analyses and critiques of modern Western culture; its relationship to discursive, social, economic, disciplinary, and gendering practices.

253. *Philosophy of Mathematics*. 3 hr. PR: PHIL. 106 or consent. Contemporary viewpoints in the foundations of mathematics. (Not offered every year.)

285. *Philosophy of Language*. I or II. 3 hr. PR: 6 hr. in philosophy or linguistic or language major or consent. Philosophical problems concerning the nature of meaning and language. (Not offered every year.)

290. *Directed Studies*. I, II, S. 1-6 hr. (May be repeated for credit.) PR: Instructor's written consent. Individually supervised research and projects.

292. *Advanced Topics in Philosophy*. I or II. 3 hr. PR: 6 hr. in philosophy or consent. Advanced philosophical investigation of selected problems and issues. Topics will vary.

302. *Philosophy of Science*. I or II. 3 hr. Philosophical problems associated with the concepts and methodology of science.

303. *Theory of Knowledge*. I or II. 3 hr. Definitions of knowledge, truth, and belief. Problems associated with skepticism, induction, perception, introspection, memory, and *a priori* knowledge.

305. *History of Philosophy*. I or II. 3-9 hr. Selected topics in the history of Western philosophy, usually with concentration on one of the following periods: ancient, medieval, modern, or recent.

306. *Metaphysics*. I or II. 3 hr. Traditional problems associated with universals and particulars, reality and experiences, causality, space and time, matter and mind, the nature of the self, etc.

308. *Ethics of the Marketplace*. I, II. 3 hr. An examination of moral questions regarding the evaluation of economic systems, labor/management relationships, product liability, advertising, codes of conduct, and conflicts of interest.

310. *Ethics*. I or II. 3 hr. An examination of selected theoretical and applied problems in the field of professional ethics.

313. *Philosophy of Social Science*. I or II. PR: Consent. Philosophical problems associated with the concepts and methodology of the social sciences.

321. Seminar: Selected Topics. 3-9 hr.

391. *Advanced Topics*. I, II, S. 1-9 hr.

397. *M.A. Research or Thesis*. I, II, S. 1-9 hr. PR: Consent.

Physics

Larry E. Halliburton, Chairperson of the Department
212 Hodges Hall

Degrees Offered: Master of Science, Doctor of Philosophy

The graduate program is designed to provide a solid background in classical and modern physics, a broad understanding of major research fields, and an opportunity for in-depth investigation. Each student has a faculty advisor who will help plan a program of study and research. The first few semesters are devoted to course work, typically three courses per semester. Any student whose background is weak in a particular area is encouraged to register for the appropriate undergraduate course. The minimum grade for credit in graduate courses is C; a grade-point average of 3.0 must be maintained.

Examination Requirements

Students are required to take the graduate examination, which is offered in January and August, by the end of the third semester. The purpose of the examination, which is written and covers classical mechanics, electromagnetism, and quantum mechanics, is to verify that each student has the necessary fundamental background to begin research. A different standard of performance on the examination is required for master of science and doctor of philosophy students; an M.S. is not prerequisite to a Ph.D.

Master of Science

For students who plan to do master's research and write a thesis, the qualifying examination consists of taking two sections of the graduate examination and passing at the 40% level. They must take 24 hours of courses at the 300 level or above, including Physics 331, 333, 351, 383, and 387. The thesis gives students practical experience in working on a research problem, writing up the results, and presenting an oral defense.

Students who pass the graduate examination at the 60% level on all three sections and who take 30 hours of courses at the 300 level or above, including Physics 331, 333, 351, 383, and 387, are awarded the M.S. degree.

Doctor of Philosophy

For admission to doctor of philosophy research, a student must perform at the 60 percent level on all three sections of the graduate examination. After this examination,

research becomes the central focus. The Ph.D. qualifying examination consists of an oral presentation before a faculty committee. The student presents published material about his/her subfield of specialization. After the oral, the student is formally advanced to Ph.D. candidacy to do original research, culminating in the written dissertation and oral defense. The average completion time for the Ph.D. is five years beyond the baccalaureate and requires 36 hours of course work at the 300 level or above, with a minimum of six hours at the 400 level.

Research Groups

Research groups consist of a professor and several graduate students and/or post-doctoral fellows, with financial support from a federal agency or private industry. Departmental research specialties include condensed matter physics (theory and experiment), nonlinear dynamics (theory and experiment), applied physics (theory and experiment), plasma physics (experiment), astrophysics (theory), and elementary particle physics (theory).

GRE/TOEFL

Applicants are expected to have a bachelor's degree in physics, with upper-division courses in electricity and magnetism, mechanics, quantum mechanics, thermodynamics, and mathematical methods. Students lacking some of these courses may be admitted provisionally and will be allowed to remedy the deficiencies by taking the appropriate courses. Applicants should take the GRE general and physics tests. If English is not the student's native language, TOEFL scores are also required. Application deadline is February 15; contact the department for additional information.

Financial Aid

With rare exceptions, all students who are admitted receive financial support. Beginning students usually receive teaching assistantships; more advanced students receive research assistantships. Several fellowships are available for outstanding students, allowing full-time concentration on course work and research and more rapid progress toward the degree.

Physics (PHYS)

201. *Special Topics*. I, II. 1-6 hr. per sem. (May be repeated to max. of 24 hours.) Study of topics of current interest in physics.

213. *Introductory Electronics*. 3 hr. PR: PHYS 12. Principles and applications of integrated circuits and digital electronics. 2 hr. lec., 1 hr. lab.

221. *Optics*. 3 hr. PR: PHYS 12, MATH 18. A basic course in physical optics covering wave mathematics, propagation, polarization, interference, and diffraction; applications in geometrical optics and selected topics in scattering and quantum optics.

225. *Atomic Physics*. I, II. 3 hr. PR: PHYS 124 or equiv. Relativistic mechanics, atomic structure, and spectra.

231,232. *Theoretical Mechanics*. I, II. 3 hr. per sem. PR: PHYS 11, 12 or equiv.; Conc.: MATH 18. Scalar, vector, and tensor fields; curvilinear coordinate systems. Kinematics and dynamics of particles, systems of particles, and rigid bodies. Lagrangian and Hamiltonian formulation. Relativistic motion.

233,234. *Electricity and Magnetism*. I, II. 3 hr. PR: PHYS 12, MATH 18. Electrostatics, electrostatics in matter, magnetostatics, magnetostatics in matter, Maxwell's equations, reflection and refraction, wave guides and cavities.

241. *Advanced Physics Laboratory*. I, II. 1-2 hr. per sem. PR: PHYS 11, 12, 124. Experiments in physics designed to complement theory courses; gives experience in data taking and instrumentation, and methods of data evaluation and error analysis.

248. *Physics Seminar*. I, II. (No credit.) (Suggested for junior, senior, and graduate Physics majors.) These lectures acquaint students with topics of current interest in physics.

213. *Introductory Quantum Mechanics*. I. 3 hr. PR: PHYS 124, MATH 18. Fundamental principles of quantum mechanics; state functions in position and momentum space, operators, Schrodinger's equation, applications to one-dimensional problems, approximation methods, the hydrogen atom, angular momentum and spin.

263. *Nuclear Physics*. I, II. 3 hr. PR: PHYS 124; MATH 17. Study of characteristic properties of nuclei and their structure as inferred from nuclear decays and reactions, leading to a knowledge of nuclear forces and models.

271. *Solid State Physics*. I, II. 3 hr. PR: PHYS 124 or equiv.; MATH 17. Properties of crystalline solids; includes crystal structure, binding, lattice vibrations and an investigation of thermal, electrical, magnetic, and optical phenomena based on energy band theory.

281. *Plasma Physics* 3 hr. PHYS 12, Conc: PHYS 234. Introductory course in the physics of ionized gases; particle and fluid treatment of plasmas, waves, equilibrium and stability, kinetic theory, and nonlinear effects.

283. *Thermodynamics and Statistical Mechanics*. II. 3 hr. PR: PHYS 124 or equiv.; MATH 17. Introduction to the statistical foundations of thermodynamics; applications of the fundamental laws of thermodynamics to physical and chemical systems.

301. *Special Topics*. I, II. 1-6 hr. per sem. (May be repeated to max. of 24 hours.) PR: Consent. (Primarily for Graduate students.) Specialized topics of current interest in physics.

321. *Optics*. I, II. 3 hr. PR: PHYS 11, 12 or equiv.; MATH 17. A basic course in physical optics covering radiation theory, diffraction, interference, polychromatic waves, scattering, polarization, double refraction, and selected topics in quantum optics.

325. *Intermediate Atomic Physics*. I. 3 hr. PR: PHYS 351. A review of the theory of one-electron atoms. The main emphasis is on the theory of two-electron and many-electron atoms: para and ortho helium; central field approximation; Thomas-Fermi theory; Hartree-Fock theory; L-S, J-J, and intermediate coupling; interaction with electromagnetic fields.

331. *Advanced Classical Mechanics*. I. 3 hr. PR: PHYS 231, 232, and differential equations. Lagrange and Hamilton form of equations of motion, rigid bodies, small and nonlinear oscillations. Transformation theory, relativistic dynamics, and systems with an infinite number of degrees of freedom.

333,334. *Advanced Electricity and Magnetism*. I, II. 3 hr. per sem. PR: PHYS 233, 234, and differential equations. Electrostatic and magnetostatic boundary value problems.

Maxwell's equations for time varying fields. Green's functions and integral representations; applications to radiation; diffraction, wave guides, plasma physics, and relativistic motion of charged particles.

351,352. *Quantum Mechanics*. I, II. 3 hr. per sem. PR: PHYS 251. Breakdown of classical physics, the Schrödinger equation and its interpretation, one dimensional problems, operator methods and abstract Hilbert space, identical particles, three dimensional problems, the hydrogen atom, angular momentum, spin, vector coupling, time independent perturbation theory, variational principle, atomic and molecular structure, semiclassical radiation theory, scattering theory.

354. *Outline of Physics*. S. 3 hr. PR: One year introductory college physics. (Primarily for education majors; not open to physics majors.) Elementary study of atomic and molecular structures and spectra, solid state and nuclear physics, relativity and elementary particles.

355,356. *Workshop for Physics Teachers*. S. 3 hr. per sem. PR: One year college physics; One year of college mathematics. (Primarily for Education majors; not open to Physics majors.) Techniques of apparatus construction and demonstration.

358. *Light*. II, S. 3 hr. PR: One year of college physics or equiv. (Primarily for education majors; not open to physics majors.) A demonstration course designed to illustrate the basic concepts covering light and optics.

371,372. *Intermediate Solid State Physics*. 3 hr. PR: PHYS 271, 351, or equiv. Crystal structure, reciprocal lattice, phonons, dielectric properties, optical properties, semiconductors, cooperative phenomena including superconductivity and magnetism.

383. *Statistical Mechanics*. II. 3 hr. PR: PHYS 283, 351. Ensemble theory, applications to noninteracting systems, as well as perturbative and approximate treatment of interactions. Typical applications include equilibrium constants, polymers, white dwarfs, metals, superfluids, magnetic transitions.

387. *Mathematics for Physicists and Engineers*. I. 3 hr. PR: Calculus, differential equations, PHYS 11, 12 or equiv. Complex variables: series, contour integration and conformal mapping; ordinary differential equations; Fourier series, Laplace transforms; Fourier transforms, special functions; Bessel functions and Legendre, Hermite, and Laguerre polynomials; introduction to partial differential equations; Poisson's equation, Wave equation, and diffusion equation.

388. *Mathematics for Physicists and Engineers*. II. 3 hr. PR: Calculus, differential equations, PHYS 11, 12 or equiv. Vector spaces, tensor calculus, group theory, integral equations, calculus of variations, nonlinear systems and other topics as time permits.

401. *Advanced Research Topics*. I, II. 1-6 hr. (May be repeated to max. of 24 hours.) PR: Consent. Specialized topics in field of physics related to the research interests of the department. Open only to students who have completed most of the basic graduate courses.

410. *High Energy Physics*. I. 3 hr. PR: PHYS 351, 352. Fundamental particle interactions, field theory, S-matrix expansions, space time symmetries, internal symmetries, unsolved problems.

425. *Advanced Atomic and Molecular Physics*. 3 hr. PR: PHYS 325. Quantum mechanics of atoms and molecules at an advanced level emphasizing the role of symmetry. Necessary material on group theory is included.

463. *Advanced Nuclear Physics*. I, II. 3 hr. PR: PHYS 225, 251, and 263. Detailed presentation of nuclear models, nuclear reaction mechanisms, nuclear forces and theories of nuclear disintegrations.

471. *Advanced Solid State Physics*. II. (Alternate years.) 3 hr. PR: PHYS 271, 325, 351. Advanced treatment of solid state theory; electronic, vibrational, transport, thermodynamic, and magnetic properties of solids.

481. *Kinetic Theory of Plasma*. 3 hr. PR: PHYS 281, 331, and 334. An advanced course focusing on the Vlasov theory of plasma equilibrium and stability. The application to plasma waves will be emphasized.

482. *Magnetohydrodynamic Theory of Plasma*. 3 hr. PR: PHYS 281, 331, 334. Theory of ideal magnetohydrodynamics for plasma equilibrium and stability; emphasis on analytic theory in developing the model, describing various equilibria, and evaluating plasma stability.

497. *Research*. I, II, S. 1-15 hr.

Astronomy (ASTR)

216. *Astronomy for Teachers*. S. 3 hr. PR: Consent. Basic concepts and methods in astronomy and how to teach them using the celestial sphere and geometrical tools. Observational work at night. The use of a telescope and camera.

325. *Intermediate Astronomy*. II. 3 hr. PR: MATH 16 or consent. Measurement of the universe; trigonometric parallax, statistical parallax, moving clusters, cluster H-R diagrams, masses of various binary systems, Kepler's Laws, and the three-body problem.

267. *Basic Astrophysics*. I, II. 3 hr. PR: PHYS 124 or equiv. The several equations of state, the Boltzmann-Saha equation, the H-R diagram and interpretation of spectra, introduction to radiative transfer and stellar structure.

Political Science

Allan S. Hammock, Chairperson of the Department

316-A Woodburn Hall

Degrees Offered: Master of Arts, Doctor of Philosophy

The master of arts and doctor of philosophy programs in political science are designed to give advanced training to students who desire a career in government or the private sector as policy analysts or who wish to enter selected teaching or research fields with a specialization in public policy (either U.S. domestic or international), American politics, state politics, comparative politics, and/or international politics.

Master of Arts

The master of arts with emphasis in public policy is offered by the Department of Political Science in cooperation with the Department of Economics. It is designed to

provide students with a broad knowledge of the policy making process and the many factors influencing public policies at the international, national, state, and local levels of government. A problem-analytic approach, drawn from both economics and political science, is used to develop the ability to comprehend, assess, and evaluate issues, problems, and policies in the public sector. Prospective graduates are expected to be skilled at gathering and interpreting data, reporting, writing, and analyzing policy options and alternatives, and evaluating the intended and unintended consequences of public programs and policies. Most graduates will take jobs in government or with private firms needing specialists in policy analysis.

Prerequisites/Requirements Ideally, applicants for the master of arts degree should have a B.A. in political science (with a minimum of six hours in economics) or a B.A. or B.S. in economics (with a minimum of six hours in political science). However, students from other fields and disciplines are also encouraged to apply. In addition, the applicant should have an overall grade-point average of 2.75, and should submit three letters of recommendation from faculty familiar with the student's work. All students must also submit the Verbal and Quantitative results of the Graduate Record Examination.

In order to remain in good standing, students must maintain a 3.0 cumulative average and receive a 3.0 average in each semester for which they are enrolled. Students who do not maintain a 3.0 cumulative average will be placed on probation and will be suspended if they fail to regain a 3.0 cumulative average in their next nine hours of study.

Admission Admission to candidacy for the M.A. degree requires that the student complete a minimum of 36 hours (exclusive of colloquium) in a specialized curriculum offered by the Department of Political Science and the Department of Economics. This curriculum includes courses in economics, policy evaluation, the policy process, and public policy analysis. In addition, students must complete work in political science methodology and statistical methods. All students must enroll in POLS 499 *Colloquium* each semester in residence.

Research The M.A. degree provides an optional research practicum or internship during the fourth semester of work. The practicum enables the student to conduct actual policy research in a public agency. The practicum will carry an additional six hours of graduate credit. Students may also choose a six-hour thesis option.

Examinations Students will be expected to pass final written/oral examinations in policy analysis. Students who fail examinations may be allowed to retake them at the next regularly scheduled examination period. It is contrary to departmental policy to give a third examination.

Doctor of Philosophy

The doctor of philosophy degree is designed for persons planning careers either as policy analysts in government or as researchers and teachers in institutions of higher education. Those students who choose to enter the Ph.D. program emphasizing policy analysis will receive training appropriate for persons who wish to undertake research and analysis on public issues in government, both foreign and domestic. This training includes a comprehensive knowledge of policy formulation, implementation, and evaluation and a thorough understanding of the dynamics of political institutions. A central focus of the policy studies option will be competence in research methodology and statistical techniques of policy analysis.

Those students who choose to enter the Ph.D. program with the intention of entering the field of research and teaching may concentrate on policy studies or take a more

traditional curriculum that features four fields: American national and state politics, international relations, comparative politics, and public policy and administration.

Admission Admission to the Ph.D. program is open to students with either a bachelor's or a master's degree. Students with degrees in political science, economics, public administration, sociology, psychology, engineering, social work, business, law, medicine, or journalism are encouraged to apply. An undergraduate applicant should have a grade-point average of 3.0; a graduate applicant 3.5. In addition, all applicants must submit the results of the Graduate Record Examination and at least three letters of recommendation from faculty familiar with the applicant's work. Admission will be based on an overall assessment of the individual's record.

Candidacy The work of all individuals admitted to the doctoral program will be formally evaluated at the end of the first two semesters (at least 18 credit hours of study) at which time one of the following recommendations is made: (1) admission to candidacy for the doctoral degree; (2) admission to the master's degree program in public policy studies; or (3) termination.

The program of each person admitted to the doctoral program is designed in accordance with his or her career objectives and previous training. A complete description of the Ph.D. program and course requirements may be obtained by writing the Director of Graduate Studies, Department of Political Science, West Virginia University, Morgantown, WV 26506. This should be done before application to the program.

Minimum Requirements

The following constitute the formal minimum requirements of the Ph.D. program:

Public Policy Option	General Option
Public Policy Core (18 hrs)	Public Policy (15 hrs)
Policy Research Methods (15 hrs)	Research Methods (12 hrs)
Economics (6 hrs)	Elective Specialty I (15 hrs)
Policy Field (18 hrs)	Elective Specialty II (15 hrs)
Dissertation (24 hrs)	Dissertation (24 hrs)
Total: 81 hrs	Total: 81 hrs

In addition to the formal course work, students must also pass written and oral comprehensive examinations in their specialty fields. All course work completed for the M.A. at West Virginia University also counts toward the Ph.D. Course work from other institutions will be evaluated on a case-by-case basis.

In order to remain in good standing, students must maintain a 3.0 cumulative average and receive a 3.0 average in each semester for which they are enrolled. Students are required to spend at least one year (two semesters) in residence enrolled in a full-time graduate program of no less than nine semester hours each semester. All graduate students must enroll in POLS 499 (Colloquium) each semester in residence.

Faculty

The Department of Political Science has 19 full-time faculty members. The major strengths of the graduate faculty are: policy studies (15 faculty with policy specialties); American national and state politics and administration (eight faculty with U.S. politics and institutional specialties); international and comparative politics (four faculty with international affairs specialties, including U.S. foreign policy, comparative foreign policy, and national security policy); comparative politics (three faculty with comparative politics specialties, including development politics, African, Western European, Canadian, and Far Eastern area studies, and cross-national political analysis); research methods (two

faulty with advanced statistical analysis specialties); and policy fields (ten faculty with policy specialties in criminal law, development, political economy, energy, environmental, foreign policy, gender, national security, regulation, and social welfare). In addition, faculty in the Department of Public Administration and the Department of Economics teach courses included in the M.A. and Ph.D. curricula.

Research

Graduate students have opportunities to conduct research with the political science faculty, faculty associated with the Policy Analysis Group, the Institute for Public Affairs, and other research organizations at the University, and with externally funded grant projects. Opportunities exist for field experience in various government settings, including the West Virginia Legislature, which annually provides paid internships for graduate students in the M.A. or Ph.D. programs.

Financial Aid

The department has a number of assistantships and fellowships available for students in both the M.A. and Ph.D. programs. Students interested in financial assistance should apply directly to the Department of Political Science. Graduate assistants may enroll for no more than nine credit hours per semester (excluding colloquium)

Political Science (POLS)

210. *The American Presidency*. I, II. 3 hr. Institutional, behavioral, and societal forces which have given rise to the modern presidency; factors which enhance and constrain the exercise of the presidential power over those constituencies with which the president must interact; the nature and consequences of the presidential decision-making process; desirability and/or feasibility of reforming the presidency.

211. *Political Parties and Electoral Processes*. II. 3 hr. Parties and elections in America; emphasis on nomination processes, general elections, campaigns, mass media, campaign finance, voting, electoral college, and parties in government.

212. *Judicial Politics*. II. 3 hr. The role of courts and judges in the American political process. Topics include the structure and process of courts, factors involved in judicial decision-making, and the appropriate role of courts in matters of public policy.

213. *American Constitutional Law*. I. 3 hr. The role of the Constitution in the American political system. Topics covered include the political concept of constitutionalism; the role of the Supreme Court in the political process; division of powers among the three branches of government; and the constitutional relation between the national government and the states.

214. *Civil Liberties in the U.S.* I, II. 3 hr. Issues in constitutional law concerning personal liberties against government action. Topics include free speech, press and association; religious freedoms; abortion; the right to privacy; due process of law; and criminal procedure safeguards.

215. *Law and Public Policy*. I, II, S. 3 hr. Advanced examination of the role of courts in policy-making, including agenda-setting and formulation by courts, the outcomes of policy litigation, and the politics of legal reform.

216. *Public Opinion and Politics*. I, II. 3 hr. In depth treatment of the origins, content, and impact of public opinion in American politics; political ideology, partisanship, socialization, mass media, opinion polls, and survey research techniques.

217. *Interest Groups and American Democracy*. I, II, S. 3 hr. The role of interest groups in American politics, focusing on their distribution and internal dynamics, their involvement in campaigns and elections, their influence on public policy, and their place in a democratic system.

218. *The Legislative Process*. II. 3 hr. Structure and organization of legislative bodies, powers of legislature, detailed study of lawmaking procedures, influences of outside forces.

221. *West Virginia Government and Administration*. I, II. 3 hr. Organization and operation of the state government of West Virginia.

225. *Urban Politics*. I. 3 hr. Legal basis, structure, processes, and politics of urban governments and cooperative-conflict relations with other governmental units.

226. *Problems of State and Local Government*. I, II. 3 hr. PR: POLS 120 or equiv. Change processes in state and local systems in the context of federalism.

231. *Criminal Law, Policy and Administration*. I, II. 3 hr. Legal and administrative approach to policy issues in crime and punishment. Focuses on the criminal law, court decisions, and implementation of law and policy in the criminal justice field.

233. *Politics of Social Welfare Policy*. I, II. 3 hr. Questions of poverty and inequality; who are the poor, what causes economic inequality, what have been governmental and private solutions, and what successes and failures have there been in the war against poverty?

234. *Politics of Economic Policy*. I, II. 3 hr. An examination of U.S. economic policy, with an emphasis on the political considerations that influence policy development and implementation; government regulation, taxation, and spending.

235. *Civil Rights Policy and Politics*. II. 3 hr. Analysis of the law, politics, and policy related to discrimination in public accommodations, voting, education, housing and employment based on race, gender, national origin, handicapped status and age.

236. *Energy Policy and Politics*. II. 3 hr. An examination of U.S. energy policies and politics, with particular emphasis placed on the development and implementation of energy policies since 1973.

238. *Politics of Environmental Policy*. I. 3 hr. Examines the formulation and evaluation of United States environmental policy.

242. *American Administrative Systems*. I. 3 hr. Analysis of the nature and processes of American public administration (political, legal, economic, and social conditions), including the role of the bureaucracy in a democracy. (Equiv. to PUBA 242.)

244. *Administrative Law*. II. 3 hr. PR: POLS 140 or consent. Administrative powers and limitations, procedure in administrative adjudication and rule-making, discretion, ultra vires as a check on administrators, notice and hearing, administrative penalties, judicial control and administrative liability.

250. *Government of Japan*. II. 3 hr. Survey of political institutions and governmental process of Japan with special emphasis on the analysis of political problems in the post-war period.

251. *Government of Soviet Union and Eastern Europe*. II. 3 hr. Survey of the political nondemocratic governments of the Soviet Union and its Eastern European satellites, with special reference to the guiding role and development of Marxism-Leninism.

253. *Western Democratic Governments*. I. 3 hr. Examination of the government and politics of selected western democracies. Included are Canada, Great Britain, France, and West Germany.

254. *Government of China*. I. 3 hr. Survey of political institutions and governmental process of Communist China with a special emphasis on the analysis of political problems since 1949.

255. *Governments of Latin America*. I. 3 hr. Comparative study of the major nations of Latin America.

256. *Governments of the Middle East*. II. 3 hr. Governments and political forces of the Middle East.

258. *Politics of Africa*. II. 3 hr. Historical legacies and current political processes of tropical African countries.

261. *International Organization*. II. 3 hr. Agencies created since the close of World War II. Some reference to development of international law and United Nations.

263. *Public International Law*. I. 3 hr. Law governing relations among nations, including development of rules, means of enforcement, and conflicts between theory and practice.

264. *Conduct of American Foreign Relations*. I. 3 hr. Concepts about and factors influencing the formulation and execution of United States foreign relations; analysis of past policies and current issue areas in relations with major developed and developing nations and international organizations.

265. *Politics, Ethics and War*. II. 3 hr. PR: POLS 160 or consent. An examination of the relationship between politics, ethics and war with special reference to nuclear weapons and strategies. Emphasis on the causes of the nuclear dilemma.

266. *Soviet Foreign Policy*. II. 3 hr. Concepts about and factors influencing the formulation and execution of Soviet foreign relations; analysis of past policies and current issue areas in relations with major developed and developing nations and international organizations.

267. *Latin America in International Affairs*. II. 3 hr. Relations of Latin American states among themselves, with the United States, the United Nations, regional organizations, and non-Western states. Analysis in depth of the Monroe Doctrine and its corollaries and the inter-American system.

268. *International Conflict*. I, II. 3 hr. PR: POLS 160 or consent. Conflict in international relations, particularly armed conflict between nations. The role of force, impact of modern technology and nuclear weaponry, theoretical and research approaches to causes of conflict and modes of conflict resolution.

269. *Far Eastern International Relations*. II. 3 hr. International relations of Far Eastern countries with emphasis on historic roots of recent conflicts, the competitive role of the

United States and the Soviet Union, confrontation between the communist and anticommunist countries in the region, and the regional cooperation and security problems in the postwar period.

272. *Recent and Contemporary Political Thought*. I. 3 hr. Examination of integral liberalism and the forces leading to the decline of liberalism and a critical analysis of the fascist and communist ideologies with their threat to the traditions of western civilization embodied in Christianity and conservatism.

273. *American Political Theory*. I, II. 3 hr. Major political ideas and their influence upon American society and government from the seventeenth century to present.

275. *Psychological Theories of Politics*. II. 3 hr. Introduction to rational choice theory and various psychological theories of politics; application of psychological theories to both international relations and American politics.

279. *Analysis of Political Behavior*. II. 3 hr. Examines political behavior in terms of recent behavior theories emanating from a variety of disciplines.

299. *Special Topics*. I, II. 1-3 hr.

300. *Introduction to Policy Research*. I. 3 hr. Introduction to the research methods and techniques used in policy analysis. Topics include logic of inquiry, research designs, measurement, and survey and unobtrusive research. 3 hr. seminar.

310. *Intergovernmental Relations*. I. 3 hr. Examination of the politics and policy consequences of intergovernmental relations in the United States. Topics include the development of intergovernmental relations, regulatory federalism, and intergovernmental fiscal relations. 3 hr. seminar.

330. *Policy Analysis*. I. 3 hr. Overview of the field of public policy studies. The issues and problems involved in studying policy making, and assessment of policy analysis as a mode of thinking and inquiry. 3 hr. seminar.

331. *Economic Analysis of Public Policies*. 3 hr. Application of economic analysis to questions of public policy. Consideration of problems of public goods and usefulness of cost benefit analysis to policy making. (Equiv. to ECON 343.)

336. *Politics of Agenda Setting*. I, II. 3 hr. Examines the confluence of social, economic, and political influences on the development of public problems and their placement on the policy agenda. 3 hr. seminar.

345. *Public Administration and Policy Development*. II. 3 hr. PR: POLS 140 or consent. Decision-making and policy development in the administrative process by the case method. 3 hr. seminar.

336. *Politics of Planned Development*. I. 3 hr. Political aspects of social, economic, and technological change, with special reference to the politics of development planning and administration. 3 hr. seminar.

355. *Comparative Public Policy*. I, II. 3 hr. Comparison of public policy outputs in several western European countries and Japan with emphasis on the analysis of variables that account for variations in distributive, regulative, and extractive policies. 3 hr. seminar.

360. *International Public Policy Analysis*. II. 3 hr. Provides a bridge between the conventional study of international relations and the analysis of externally directed public policy. Introduces the graduate student to specific policy areas such as international trade, aid, resources, and security policy. 3 hr. seminar.

400. *Quantitative Methods for Policy Analysis*. II. 3 hr. PR: POLS 300 and STAT 311, or equivalents. Application of range of statistical techniques in public policy research. Includes use of selected computer software commonly used in policy analysis.

401. *Advanced Quantitative Methods*. I. 3 hr. PR: POLS 400 or equivalent. Advanced topics in quantitative methods for policy research. Methods surveyed include multiple linear regression, time-series analysis, causal modeling and linear programming.

403. *Internship*. I, II. 6-9 hr. per sem.; students may enroll more than once. PR: Consent.

410. *Seminar in Judicial Politics, Policy, and Law*. I. 3 hr. Judicial influence on American public policy with emphasis on the political theory of American law, the agenda of disputes, the formulation of public policy by courts, and the effects of judicial policy on politics. 3 hr. seminar.

429. *Seminar in State and Local Government*. I, II. 3 hr. PR: Consent.

430. *Seminar: American Policy Process*. I. 3 hr. A survey of the literature which deals with how various institutions and linkage mechanisms in U.S. politics affect the public policy process. 3 hr. seminar.

435. *Public Policy Evaluation Research*. II. 3 hr. Methods and techniques in evaluating public policies. Topics include the relation of policy analysis to policy making; types of evaluation; planning evaluations; alternative evaluation designs; measuring program consequences; problems of utilization; and the setting of evaluation research. 3 hr. seminar.

438. *Seminar in Public Policy Implementation*. II. 3 hr. Research seminar focusing on factors influencing the capacity of government to deliver services. Includes an examination of how socio-economic conditions, technology, public opinion, interest groups, institutional actors, and decision-making variables influence policy outcomes. 3 hr. seminar.

439. *Seminar in Policy Analysis*. I, II. 3 hr. PR: POLS 335 or consent. This course requires students to conduct an original piece of quantitative policy research. Designed for advanced students, the course is taken following the completion of the department's research methods sequence. 3 hr. seminar.

441. *Directed Reading and Research in Public Administration*. I, II. 2-4 hr. per sem.; students may enroll more than once. PR: POLS 140 or consent.

480. Thesis. I, II. 2-6 hr.

491. *Advanced Study*. I, II. 1-6 hr. PR: Consent.

497. *Research*. 1-15 hr.

499. *Colloquium*. I, II. 1-6 hr.

Psychology

Philip N. Chase, Chairperson of the Department

101-A Oglebay Hall

Degrees Offered: Master of Arts, Doctor of Philosophy

Programs Offered

The doctoral degree programs in behavior analysis, lifespan developmental psychology, adult clinical psychology, and child clinical psychology prepare students for careers in teaching, research, and/or practice. The professional master's degree in adult clinical or child clinical psychology prepares students for work in community mental health centers, medical facilities, mental health and mental retardation institutions, and school systems.

Admission

Students are admitted only at the beginning of the fall semester. Application must be completed by the preceding February 1. Acceptance is based on:

- Adequate academic aptitude at the graduate level as measured by the Graduate Record Examination;
- Achievement in undergraduate course work, with a minimum grade point average of 3.0 required;
- Personal qualities that predict success in graduate study and as a professional after graduation;
- Adequate preparation in psychology and related fields; and
- Fit between the applicant's interests and the offerings of a department graduate program.

Courses

Graduate courses in psychology are open only to regular graduate students except by special departmental permission. Students in the master of arts and doctor of philosophy programs must have a final 3.0 average in all psychology courses attempted.

Master of Arts Requirements

Two years of full-time study with a minimum of 48 hours of credit are required for the master of arts degree. Six hours of credit may be counted for the M.A. thesis. Students who are accepted into one of the Ph.D. programs are required to complete an M.A. thesis and will receive the M.A. degree upon completing the thesis and credit-hour requirements. Students accepted into the professional M.A. degree track in clinical psychology must complete a specified sequence of courses and complete a six-month, full-time internship. Completion of a thesis is optional.

Doctor of Philosophy Requirements

Students are accepted for study toward the doctor of philosophy degree upon entry into the department. Each program requires completion of a specific set of required and elective courses (described in detail in the Department Graduate Handbook). Students

are formally admitted to doctoral candidacy after completion of the master's degree or its equivalent, a comprehensive preliminary examination, and other requirements.

A dissertation and oral examination on the dissertation are required for all Ph.D. candidates. Students in the clinical psychology programs must also complete a 12-month internship. The internship must be approved by the program and by the director of clinical training.

Non-Degree Students

Graduate courses in psychology are designed for regularly admitted degree-seeking students as part of an extensive program of preparing those students for professional careers. Thus, students not admitted into one of the psychology graduate programs are discouraged from taking graduate courses in psychology. Non-psychology graduate students must obtain the instructor's permission to enroll in any psychology graduate course.

Psychology (PSYC)

213. *Directed Studies*. I, II, S. 1-3 hr. PR: Consent. (No more than 10 hours may be applied to the 42 hours of psychology to which Psychology majors are limited.) Individually supervised reading, research, and/or applied projects.

218. *History & Systems of Psych*. I or II. 3 hr. PR: One 100-level psychology course; junior or senior psychology major or consent. A survey of psychology from its origins in philosophy, biology, and physics through the early major schools of psychological thought to modern perspectives on the science of behavior and its applications to human affairs.

223. *Cognition and Memory*. I or II. 3 hr. PR: PSYC 102; junior or senior psychology major or consent. Theoretical and empirical issues in cognitive psychology. Topics include mechanisms and theories of attention, memory, language, and conceptual processes.

224. *Learning and Behavior Theory*. I or II. 3 hr. PR: PSYC 171; junior or senior psychology major or consent. Advanced course in empirical and theoretical issues in the psychology of learning.

225. *Perception*. I or II. 3 hr. PR: PSYC 102; junior or senior psychology major or consent. Survey of the structure and function of human sensory systems (primarily visual and auditory), perceptual issues and theories.

226. *Physiological Psychology*. I or II. 3 hr. PR: PSYC 131; junior or senior psychology major or consent. Advanced study of the physiological mechanisms of behavior. Topics include neural and endocrine mechanisms of behavior and issues, methods, and findings in behavioral neuroscience.

242. *Prenatal & Infant Development*. I or II. 3 hr. PR: PSYC 141; junior or senior psychology major or consent. Behavior and development from conception to two years. Includes behavioral genetics and hazards of prenatal development, as well as sensory-motor, cognitive, language, and socioemotional behavior during infancy.

243. *Child & Adolescent Behavior*. I or II. 3 hr. PR: PSYC 141; junior or senior psychology major or consent. Theory and research on major psychological processes in childhood and adolescence; maturation, personality, socialization, sensory, and cognitive development.

245. *Adulthood and Aging*. I or II. 3 hr. PR: PSYC 141; junior or senior psychology major or consent. Psychological issues in the study of adulthood, with an emphasis on the characteristics of older adults. Topics include the psychosocial and biological context of aging, cognitive and personality changes from early to late adulthood, psychopathology in later life, dementia, issues in caregiving, and death and dying.

251. *Social Psychology*. I or II. 3 hr. PR: PSYC 151; junior or senior psychology major or consent. Social factors that determine human behavior, survey of research in selected areas of social psychology and their implications for social phenomena.

262. *Psychological Assessment*. I or II. 3 hr. PR: One 100-level psychology course; junior or senior psychology major or consent. Theory and practice in development and use of psychological assessment procedures. Includes intelligence testing, behavioral assessment, and interviewing.

263. *Personality Theory*. I or II. 3 hr. PR: One 100-level psychology course; junior or senior psychology major or consent. Theoretical and empirical readings in a survey of major perspectives in personality theory, including dynamic, cognitive, humanistic, and behavioral.

264. *Psychology of Adjustment*. I or II. 3 hr. PR: One 100-level psychology course; junior or senior psychology major or consent. Dynamic principles of human personality adjustment.

274. *Behavior Modification*. I, II. 3 hr. PR: PSYC 171; junior or senior psychology major or consent. Basic principles of behavior and their application to changing significant human behavior. Includes clinical, educational, parenting, industrial/organizational, community, and other applications.

282. *Exceptional Children*. I or II. 3 hr. PR: PSYC 141; junior or senior psychology major or consent. Exceptional mental retardation or advancement; organic disabilities having behavioral consequences, such as cerebral palsy or deafness; and behavior disorders.

295. *Seminar in Psychology*. I or II. 3 hr. (May be repeated for credit.) PR: One 100-level psychology course; junior or senior psychology major or consent. Presentation and discussion of selected topics.

297. *Honors Investigation & Thesis*. I, II, S. 3 hr. (May be repeated for credit; max. credit 6 hr.) PR: junior or senior psychology major and admission to Honors Program in Psychology. Supervised readings and investigation culminating in the honors thesis.

301. *Professional Issues in Psych*. I, II. 1-3 hr. (May be repeated for credit.) Survey of professional issues in psychology as they relate to a particular subdiscipline, topic, or issue.

302. *Ethical Issues in Psychology*. II. 1-3 hr. (May be repeated for credit with consent.) The ethical standards for psychologists are applied to research and clinical problems.

303. *Legal Issues in Psychology*. II. 1-3 hr. (May be repeated for credit with consent.) Review of the major areas in which psychologists interact with the civil and criminal legal systems.

311. *Res Design & Data Analysis 1*. I. 3 hr. Principles of experimental design in psychology including group and single subject methodologies. Topics include: (1) internal and

external validity; (2) simple and complex analysis of variance; and (3) reversal and multiple baseline designs.

312. *Res Design & Data Analysis 2*. II. 3 hr. PR: PSYC 311 or consent. Inferential statistics, simple correlation and regression, multiple correlation and regression, partial correlation, analysis of power, analysis of covariance, analysis of variance of designs with unequal cell sizes.

313. *Directed Study*. I, II, S. 1-3 hr. (May be repeated for credit.) PR: Consent. Directed reading and research in special areas.

315. *Multivariate Analysis*. I. (Alternate years.) 3 hr. PR: PSYC 311, or equiv. Data analysis techniques in psychology with application to typical research problems. Includes simple matrix algebra, multiple correlation, discriminant analysis, multivariate analysis of variance, and an introduction to factor analysis. (Equiv. to STAT 341.)

316. *Quasi-Experimental Design*. I. (Alternate Years.) 3 hr. PR: PSYC 311 and 312 or equiv. Consideration of the statistical procedures used with quasi-experimental group and single-subject designs.

320. *Experimental Analysis of Beh*. I. 3 hr. Research and theory in the psychology of learning. Assessment of traditional and behavior analytic approaches to the study of positive reinforcement, aversive control, and stimulus control. Includes laboratory work with animals.

321. *Human Behavior*. I. (Alternate years.) 3 hr. PR: PSYC 320. Review of the role of basic human operant research in testing the generality of animal-based behavior principles, analyzing phenomena that are specific to humans, and extending behavior analysis to traditional psychological problems.

323. *Applied Behavior Analysis*. II. (Alternate years.) 3 hr. PR: PSYC 320. Methodological, empirical, and conceptual issues in the application of basic research in behavior analysis to problems of social significance..

341. *Meth Issues in Dev Psych*. II. (Alternate Years). 3 hr. Methodological issues in psychological research on the major age periods and the life span. Topics include: validity; reliability; age, cohort, and time of measurement; cross-sectional, longitudinal, and mixed designs; data analytic methods; ethical issues.

342. *Concept Issues in Dev Psych*. II. (Alternate Years.) 3 hr. History, philosophies, and theories of psychological development in the major age periods and the life span; conceptual issues such as nature-nurture, sex differences, cultural differences, life events, rigidity-plasticity, continuity-discontinuity, and competence-performance.

344. *Infant Behavior and Dev*. I. (Alternate Years.) 3 hr. Evaluation of current research literature in the areas of physical, cognitive, perceptual, language, and socioemotional development from conception to approximately two years.

347. *Child & Adol Cognitive Dev*. I. (Alternate Years.) 3 hr. Examination of the psychological literature on child and adolescent cognitive development. Topics include perception, learning, language, problem solving, social cognition, and others. Research and theory are emphasized.

348. *Child & Adol Social Dev.* I. (Alternate Years.) 3 hr. Examination of the psychological literature on child and adolescent social/emotional development. Topics include parent-child, peer, and sibling relationships; effects of marital and family functioning; friendship; aggression; and altruism. Research and theory are emphasized.

349. *Adult Development and Aging.* I. (Alternate Years.) 3 hr. Current issues in research on adulthood and aging. Issues addressed include societal and biological influences on adult aging; theoretical accounts of cognitive aging; areas of positive development; personality change; psychopathology; caregiving and family issues; and death, dying, and bereavement.

364. *Child Behavior Modification.* I. 3 hr. Assessment, intervention, and evaluation strategies appropriate for childhood disorders and based on behavior principles.

375. *Fundamentals of Gerontology.* I. 3 hr. PR: MDS 50 or consent. An advanced multidisciplinary examination of current research in biological, psychological, and sociological issues of human aging and the ways in which these impinge on the individual to create both problems and new opportunities. (Also listed as BIOL 375.)

379. *Intro to Clinical Psychology.* I. 3 hr. Basic interviewing skills and current problems in the practice of clinical psychology.

381. *Behavior Pathology.* II. 3 hr. Advanced study of diagnostic classification, functional analysis, and experimental research in psychopathology of child, adult, and geriatric adjustment problems.

390. *Seminar on Teaching Psych.* I, II. 1-3 hr. (May be repeated for credit with consent.) PR: Consent. Review and discussion of methods and issues in college teaching of psychology.

397. *Master's Degree Res or Thesis.* I and II. 1-6 hr. PR: Consent.

411. *Single-Subject Research Meth.* II. (Alternate Years.) 3 hr. PR: PSYC 311 and 320. Critical evaluation of single-subject designs in basic and applied research. Major topics include single-subject methodology's historical and conceptual bases, its relation to group-statistical methods, and its role in behavioral psychology.

415. *Adv Exp Analysis of Behavior.* I. 3 hr. (May be repeated for credit with consent.) PR: PSYC 320. Selected topics and research issues in the experimental analysis of behavior.

416. *Adv Applied Behavior Analysis.* I, II. 3 hr. (May be repeated for credit with consent.) PR: PSYC 323. Application of research and theory of behavior analysis to social problems; other selected topics.

417. *Res Issues in Behav Analysis.* I, II. 3 hr. (May be repeated for credit with consent.) PR: Consent. Examination of research issues in general psychology as approached from a behavior analytic perspective. Specific topics vary from year to year.

419. *Seminar in Methodology.* I, II. 1-3 hr. (May be repeated for credit with consent.) Current problems and techniques in research design, data analysis, and research methods.

420. *Reinforcement and Punishment*. II. (Alternate Years.) 3 hr. PR: PSYC 320. Examination of theories of response acquisition, maintenance, and suppression in the context of recent experimental work with animals and humans.

421. *Behavior Theory & Philosophy*. I. (Alternate Years.) 3 hr. PR: PSYC 320 or equiv. Critical consideration of contemporary concepts, theories, and methods of psychology.

423. *Behavior Analysis Practicum*. II. 3 hr. PR: PSYC 323 and consent. Supervised applied behavior analysis experience integrated with a seminar emphasizing group solutions to problems that individuals encounter in students' applied projects. Progress and final project reports are presented and evaluated. (1 hr. seminar; 2 hr. practicum.)

424. *Social Behavior*. II. (Alternate Years.) 3 hr. Examines current concepts, research, and findings in social psychology from various perspectives. Focuses on understanding and explaining the social context of individual and group behavior.

425. *History and Systems*. II. (Alternate Years.) 3 hr. Study of the history of psychology from its roots in physics, biology, and philosophy. The development of American psychology is emphasized.

426. *Stimulus Control and Memory*. II. (Alternate Years.) 3 hr. PR: PSYC 320 or consent. Critical review of basic research and theory in discrimination learning, stimulus generalization, and memory.

427. *Advanced Behavior Analysis Practicum*. I, II, S. 1-6 hr. PR: PSYC 423 or consent. Supervised applied behavior analysis experience in an approved setting.

436. *Top Sem: Cognitive Dev*. II. (Alternate Years.) 3 hr. (May be repeated for credit with consent.) Topical seminar on current issues in cognition and learning over the life span or during selected periods of the life span.

437. *Practicum in Dev Psych*. I, II, S. 1-6 hr. PR: Consent. Provides experience in a wide range of applied settings. Sites are chosen to accommodate exposure to the entire lifespan from infancy through old age. Supervising responsibilities are determined by the instructor-in-charge in the agency.

442. *Top Sem: Life Span Dev*. II. 3 hr. (May be repeated for credit with consent.) Topical seminar exploring a particular period of the life span or perspectives on the life span.

443. *Top Sem: Social Development*. II. 3 hr. (May be repeated for credit with consent.) Topical seminar on current issues in personality and socialization over the life span or during selected periods of the life span.

456. *Program Eval in Clinical Serv*. I. (Alternate Years.) 3 hr. Examines the nature, method, and process of evaluative research, especially as it applies to social and behavioral treatment and service delivery programs.

464. *Family and Marital Therapy*. II. (Alternate Years.) 3 hr. Examines both theoretical and practical aspects of the assessment and treatment of family and marital difficulties.

467. *Child Clin Psych Practicum*. I, II, S. 1-15 hr. (May be repeated for credit.) PR: Consent. Supervised field experience in various aspects of delivering psychological services

directly or indirectly to children. Experience in assessment, treatment, program design, administration, and evaluation.

468. *Sem in Child Clinical Psych.* I or II. 1-3 hr. (May be repeated for credit with consent.) Current issues and research related to a particular area of clinical psychology involving children.

470. *Beh & Psych Assessment 1.* I. 3 hr. Conceptual and methodological bases for behavioral assessment; comparison of trait-oriented versus behavioral assessment; design and evaluation of measurement systems, particularly self-report, ratings by others, and direct observation, within the basic framework of generalizability theory.

471. *Beh & Psych Assessment 2.* II. 3 hr. PR: PSYC 470. Evaluation of clinically relevant behavior and environments by means of testing and other methods. Includes test selection, administration, and report writing.

477. *Adult Clin Psych Practicum.* I, II, S. 1-15 hr. (May be repeated for credit.) PR: Consent. Supervised practice of psychological techniques in clinics or institutional settings; experience in psychological testing, interviewing, report writing, case presentation, interpretation of tests and supportive counseling.

479. *Sem in Clinical Psychology.* I or II. 1-3 hr. (May be repeated for credit with consent.) Research and problems in clinical psychology.

480. *Clinical Neuropsychology.* II. (Alternate years.) 3 hr. Neuroanatomical foundations, neurobehavioral disorders, neuropsychological assessments, and psychopharmacological principles and practices relevant to clinical psychology.

481. *Psychophysiology.* II. (Alternative Years.) 3 hr. PR: 3 hr. of physiological psychology or consent. The current state of theory, methods, and findings concerning the association of physiological response systems and psychological states and processes, including biofeedback intervention.

482. *Adult Behavior Therapy.* II. 3 hr. Reviews the roots and development of behavioral intervention with adult populations. Applied clinical intervention is stressed in concert with evaluation and research application.

483. *Integrat Beh Psychotherapy.* II. (Alternate Years.) 3 hr. Conceptual and practical introduction to basic tenets, concepts, and techniques of major schools of psychotherapy. Reviews psychotherapy integration efforts by analyzing therapy process variables and therapist activities presumably common to many effective forms of therapy.

490. *Teaching Practicum.* I, II, S. 1-3 hr. (May be repeated for credit.) PR: Consent. Supervised practice in college teaching of psychology.

497. *Research.* (Dissertation). I, II, S. 1-15 hr. (May be repeated for credit.) PR: Consent.

Public Administration

David G. Williams, Chairperson of the Department

302-B Woodburn Hall P.O. Box 6322

Degree Offered: Master of Public Administration

The Department of Public Administration offers a public administration curriculum for graduate students seeking the degree of master of public administration (M.P.A.) or a specialization as part of another graduate degree program. This program provides a professional orientation to the primary facets of public management.

Curriculum

The master of public administration curriculum serves the needs of students from a variety of backgrounds who wish to pursue careers in public service. It directs particular attention to developing an understanding of the management function in the public context as well as preparation in utilizing advanced management techniques applicable to all levels of government—local, state, national, and international—as well as the not-for-profit sector, particularly health and hospital organizations.

The study program is designed to supply an academic foundation for comprehension of the range of processes and management approaches employed in public administration. These include public management theory and practice, personnel administration, budgetary and financial management, organizational dynamics, legal and ethical concerns, practically-oriented research, and leadership. Particular stress is placed on those functions and issues that require the greatest degree of adaptation, innovation, and responsiveness on the part of the professional administrator.

The curriculum reflects the diversity of skills required by all levels of government. The range of needs is broad in scope; students apply from diverse backgrounds, including political science, other social sciences, physical sciences, humanities, and from positions in public service, not-for-profit, and private sectors.

General Requirements

The M.P.A. degree requires the completion of 47 credit hours. The general requirements are listed below. These general requirements can be tailored to individual students' needs with revisions agreed upon by both student and advisor.

- Integrative seminar (two credit hours): Orientation to professional skills and program content (PA 300).
- Foundation courses (13 credit hours): Public management theory and practice (PA 310), public financial management (PA 320), methods for public administration research (PA 330), and legal and political foundations (PA 340).
- Advanced courses (nine credit hours): Public budgeting (PA 420), applied research in public administration (PA 430), and public personnel administration (PA 441).
- Elective courses (12 credit hours): Selections from a wide range of specialized public administration elective courses and elective courses offered in other fields.
- Internship (nine credit hours): Public administration internship (PA 403) and project paper (PA 404).
- Integrative seminar (two credit hours): Application of course concepts to planned change in public organizations (PA 452).

Degree Completion

It usually takes four semesters for full-time students to complete the M.P.A. degree. Course work can be completed in two semesters and a summer. In addition, the internship is generally one semester in length, although a variety of internship arrangements

are possible. For those individuals who have had substantial public service experience, internship credit can be awarded.

Health Care Administration

Elective courses are offered in health care administration for students who desire to specialize in this area as part of the M.P.A. degree. A certificate program is also available. Check at the department for details.

Joint Degrees

The department has established both joint degree and double degree programs with a number of other graduate programs. A joint J.D./M.P.A. degree program has been established with the College of Law to provide preparation in both law and public administration. A joint M.S.W./M.P.A. degree has been developed with the cooperation of the School of Social Work to provide preparation for administrators in the social services. Double degree programs may also be arranged with other academic programs and professional schools. Graduate studies regulations permit limited credit from one graduate degree to be applied to a second degree. Students may pursue two degrees and use approved course work for both degrees.

Recommended Courses

While many tool skills are included in the required courses, it is strongly recommended that students take courses in accounting, statistics, and computer science as part of their undergraduate program. Course work may also be taken at the graduate level in these subjects (200 and above) and counted as elective hours.

Minor

A graduate minor in public administration may be taken in conjunction with other graduate degrees in the College of Arts and Sciences. In addition, a graduate minor in public administration may be part of graduate degree programs outside the College as approved by the graduate committee for that student.

At the master's level, a minor consists of 12 hours of course work (PA 310, 320, 340, and one advanced course). At the doctoral level, 15 hours of course work is required (PA 310, 320, 340, and two advanced courses). A grade-point average of 3.0 must be achieved for the courses taken in the graduate minor.

Changes in course requirements within the hour limits may be approved by the Department of Public Administration for students with specialized needs or background experience.

Admission

Candidates must meet the WVU general admission requirements for graduation from an accredited college and grade-point average. Admission into the M.P.A. program is competitive with decisions based on:

- Application for admission and transcripts (submitted to the Office of Admissions and Records).
- Three letters of evaluation (forms are available from chairperson of the Department of Public Administration), Graduate Record Examination scores for the aptitude test, and a vita. These materials should be submitted to the chairperson of the Department of Public Administration.

In the case of practicing administrators, a record of accomplishment in administrative performance will be weighed heavily in combination with the criteria outlined above.

Application Deadline

The deadline for fall or summer applications is April 1; Applicants will be notified around April 15; deadline for January admission is October 15; applicants will be notified around November 1. Decisions on applications will be made during these two periods, although late applications are considered if space is available.

Application forms and additional information may be obtained by contacting the chairperson of the Department of Public Administration.

Public Administration (PUBA)

300. *Professional Skills Seminar*. I, II. 2 hr. PR: Consent. Orientation and overview of public administration; M.P.A. program content and expectations; research resources and computer applications; professional development activities and public service.

310. *Public Management Theory and Practice*. I, II, S. 3 hr. Graduate level introduction to management theory and practice in the public sector, including contextual influences, administrative behavior and motivation, decision-making, leadership, organizational design, communication and evaluation.

320. *Public Financial Management*. I, II. 3 hr. PR: Consent. Principles and practices of public sector financial management including management control concepts, governmental financial accounting and reporting, analytical and managerial techniques and microcomputer applications to public financial management.

330. *Methods for Public Administration Research*. I, II. 4 hr. PR: Consent. Introduction to the foundations and processes of applied research applicable to public administration, with emphasis upon data collection and analysis. Use of the personal computer for word processing and data analysis is also emphasized.

340. *Legal and Political Foundations*. I, II, 3 hr. PR: Consent. Constitutional-legal basis of American public administration; the policy making process; administrative agency relationships with executive, legislative and judicial branches; bureaucratic power and legitimacy; and administrative legal process.

345. *Public Administration and Policy Development*. II. 3 hr. Policy development examined in terms of values, process, specific policy cases, alternative "futures" analyses and policy science.

403. *Internship*. I, II, S. 6 hr. PR: Consent. A working internship in a government or public service related agency, designed to provide students with an opportunity to gain field experience, and to relate knowledge gained through course work situation. (Graded S or U.)

404. *Public Service Internship Analysis*. I, II, S. 3 hr. PR: PUBA 403, consent. Designed for students enrolled in PUBA 403. Students undertake in-depth analysis of elements of their internship (policy matters, organizational questions, administrative dilemmas, etc.), and prepare a written report.

410. *Administrative Behavior in Public Organizations*. I. 3 hr. PR: Consent. Introduces and familiarizes the student with the nature of individual and group behavior in public organizations and bureaucratic settings.

411. *Public Planning*. II. 3 hr. Principles and practices of government planning including development and management of policy, political and economic context of strategic planning and social planning.
412. *Administrative Ethics and Justice*. I. 3 hr. PR: PUBA 310 or consent. Analysis of ethical issues in public administration. Study of the concepts of distributive and procedural justice and their applications to administrative decision-making.
420. *Public Budgeting*. I, II. 3 hr. PR: PUBA 320 or consent. Advanced study of public budgeting at the federal, state and local levels of government. Emphasis is placed on principles of public finance, budgeting processes and approaches; revenue sources and tax structures; and budget preparation and analysis.
430. *Applied Research in Public Administration*. I, II 3 hr. PR: PUBA 330, consent. Completion of an original, quantitative, applied research project dealing with issues and/or problems in the public sector.
431. *Information Management in Public Administration*. II. 3 hr. Concepts and practice of information management in the public sector; computer applications and their impact on organizational performance as well as public accountability, political and administrative constraints, ethics and privacy.
441. *Public Personnel Administration*. I, II, S. 3 hr. PR: Consent. Concept of merit and ideological roots of merit system; personnel functions in government with emphasis upon acquiring and managing human resources, equity, employee and executive development and problems of patronage and employee relations.
443. *Public Employee Labor Relations*. II. 3 hr. PR: Consent. Provides overview of theory, structures, and issues of public-sector labor relations; specific knowledge and training in processes and behaviors of contract negotiation and contract maintenance; and introduction to conflict management in non-unionized settings.
452. *Capstone Seminar: Strategies for Change*. I, II. 2 hr. PR: Consent. Develops knowledge base and techniques for using Public Administration concepts gained in the curriculum to effect planned change in organizations and cope with its ethical implications.
491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Focuses on those subjects of most topical concern in public administration.
492. *Directed Study*. I, II, S. 1-6 hr. PR: Consent. Directed study, reading and/or research.
494. *Special Seminar: (topic)*. II, 1-6 hr. Special seminars arranged for advanced graduate students.

Sociology and Anthropology

Ronald Althouse, Chairperson of the Department

423 Hodges Hall

Degree Offered: Master of Arts

The Department of Sociology and Anthropology offers an emphasis in applied social research leading to the degree of master of arts. Students are trained to be able to take positions in government, universities, community agencies, and private industry that require them to design and conduct research for purposes of evaluating policies and programs, documenting social needs, monitoring service delivery, and marketing products and services. The program also serves as a good foundation for students who may later choose to pursue doctoral studies.

Admission

Applicants for admission to graduate study must have a bachelor's degree from an accredited institution. Applicants should have their college or university transcripts sent directly to the WVU Office of Admissions and Records. Candidates should also submit three completed "Recommendation Forms" from former professors, supervisors, or employers. Applicants should submit a written statement of why they are interested in the program and in a career in applied social research. An on-campus interview in the department is encouraged. Scores for the Graduate Record Examination are not essential for admission but must be provided before the beginning of classes. Foreign students for whom English is not the native language are required by the University to submit *Test of English As a Foreign Language* (TOEFL) scores (a minimum score of 550 is required) and may be required to participate in the University's language orientation sessions.

Application Deadline

Application should be completed by March 1 for admission to the fall semester. **Students seeking financial assistance must request and submit a separate application form furnished by the department.**

Remediation

Students with deficient background in sociological theory or methods may be required to do remedial work. Full-time students who are admitted as special provisional students are required to complete 12 hours of approved course work with a B average or better within a year; students who fail to do so are suspended. The department graduate committee assesses all students and determines who will be permitted to continue in the program, with or without assistance. Normally, assistance is for no more than two years.

Degree Requirements

The 36 hour program requires 30 hours of course work and either the completion of an applied research report (six hours) based on an analysis of a social program or policy, or a master's thesis (six hours) for students interested in investigating a theoretical problem or methodological issue. During the first three semesters, students are required to enroll in a series of core research courses. These include survey research methods, qualitative research methods, elementary and advanced data analysis, principles of research design, and a seminar in applied social research policy.

Options

The thesis may consist of an empirical assessment of community needs, problems, policies, and/or programs or an analysis of a problem in the social scientific literature.

The student, in consultation with his/her program committee, chooses electives either in the department or elsewhere in the University as a basis for gaining expertise in some specific area of concentration.

Faculty

In addition to instruction in technical skills, faculty furnish an overview of the relationship between policy and research and provide expertise in a broad range of substantive areas, including economic development in Appalachia; gender, racial, and ethnic studies; the sociology of education and work; criminal justice system; health care delivery; injury prevention; community and organizational development; and conflict analysis and resolution.

Bachelor of Arts/Master of Arts

This special option is available to WVU undergraduate sociology and anthropology majors with a grade-point average of 3.0. By taking nine hours of specified graduate work as elective credit during the senior year, students can complete a 30-credit M.A. in only one year of full-time study. However, students cannot hold an assistantship and still complete the degree in one year. Contact the department chairperson for more details.

Sociology and Anthropology (SOCA)

201. *Sociological Theory*. II. 3 hr. PR: 6 hr. SOCA and senior standing or consent. Systematic analysis of major sociological theories viewed from the historical perspective and in terms of current research.

204. *Complex Organizations*. I. 3 hr. PR: 6 hr. SOCA or consent. The structure and functioning of large-scale, bureaucratic organizations, including studies of industrial organizations, prisons, hospitals, government bureaus, and the military in contemporary society.

205. *Class, Status, and Power*. I or II. 3 hr. PR: 6 hr. SOCA or consent. Analysis of various systems of social inequality. Emphasis on empirical studies describing social class system, distribution of status and power, and patterns of social mobility in America.

211. *Social Research Methods*. I, II. 3 hr. PR: SOCA 1 or 5 or consent. Logic of social research, elements of research design, and problems of measurement, with emphasis on survey research methodology and data analysis.

222. *Community Development*. II. 3 hr. PR: SOCA 122, or 6 hrs. SOCA, or consent. Application of sociological knowledge of structure of communities for planning programs and services. Emphasis on techniques of organizing efforts for community change in developing nations.

223. *Sociology of Rural Life*. I or II. 3 hr. PR: SOCA 1 or consent. Social aspects of rural living. Characteristics of rural population, social structure, and institutional arrangements: family, community, education, religion, recreation, health, welfare, and local government.

230. *The Criminal Justice System*. II. 3 hr. PR: SOCA 132 or consent. A sociological introduction to the criminal justice system. Analysis of police work, court activities, and corrections within the context of American social organization and societal definitions of crime and justice.

231. *Sociology of Law*. I or II. 3 hr. PR: Senior standing and permission of instructor. Development and practice of law as part of social systems; theoretical treatments of the relationship between law and social order; emphasis on issues of class, race, and gender. 3 hr. lec.
232. *Sociology of Education*. I. 3 hr. PR: SOCA 1 or consent. Education as a social institution, cultural and class influences on education, social roles and career patterns in the school system, the school and problems of the community. (Also listed as Ed. F. 300.)
233. *Sociology of Work and Work Places*. I or II. 3 hr. PR: SOCA 1 or consent. Explores the significance of work and work relations in contemporary society. Emphasis is given to the analysis of employment settings including industrial organizations.
253. *Religion, Magic, and Healing*. I or II. 3 hr. PR: 6 hr. SOCA or consent. Symbolism, magic, ritual, shamanism, sorcery, and concepts of sin and salvation related to peasant and tribal cosmologies will be examined as causes of and remedies for suffering in traditional and modern contexts.
258. *Anthropology of Health and Illness*. 3 hr. PR: 6 hr. SOCA or Consent. Health and Disease, diagnosis, and healing in cross-cultural perspectives; analyses of social, cultural, political, and economic factors in modern and traditional medical systems.
261. *Issues in Crime and Justice*. I or II. 3 hr. PR: Consent. Senior seminar on crime and the social organization of justice. Special focus on problems of professionals in prevention, enforcement, corrections, and institutional reform. Emphasis on recent research, emerging trends, and key policy choices.
290. *Special Topics*. I, II, S. 1-3 hr. PR: 6 hr. SOCA or consent. Topics change so students may enroll more than once.
291. *Honors Seminar*. I or II. 1-3 hr.
293. *Independent Study*. I, II, S. 1-6 hr. per sem. PR: 3.0 grade-point average and written departmental permission. Directed reading or research for students desiring work not available in regular course offerings.
311. *Survey Research Methods*. I. 3 hr. PR: SOCA 211 and STAT 101 or consent. Provides students with an overview of survey research including problem definition, research design, sampling, measurement, instrument construction, project management, ethical considerations, and report writing.
313. *Qualitative Methods*. I or II. 3 hr. Provides students with supervised field experiences in interviewing, participant observation, and other methods of qualitative data gathering, analysis, and presentation.
317. *Data Analysis*. II. 3 hr. PR: Stat. 101 or equiv. Using social science survey data, this course integrates statistics, computer usage, and social science theory to examine alternative methods of analyzing social science data. Makes extensive use of SPSS software package.
318. *Data Analysis*. I. 3 hr. PR: SOCA 317. Continuation of SOCA 317.

319. *Microcomputer Applications*. I. 1 hr. A directed tutorial in selected social science applications of microcomputer use with emphasis on production of research reports. (SOCA majors only.)

322. *Contemporary Sociological Theory*. II. 3 hr. Review of recent trends and orientations in sociology. Theory construction, topologies, mathematical models, and the relationship between theory and research. Review of current literature.

390. *Special Topics*. I, II. 1-3 hr. A graduate course offered as the need arises. Topics change so students may enroll more than once.

391. *Seminar*. I, II. 3-9 hr.

393. *Independent Study*. I, II, S. 1-9 hr. PR: Written departmental consent. Directed reading and/or research in a specialized area of interest.

394. *Thesis or Applied Problem Research*. I, II, S. 6 hr.

395. *Field Work*. I, II, S. 1-6 hr. PR: Departmental consent. Supervised field work.

490. *Teaching Practicum*. I, II. 1-3 hr.

497. *Research*. I, II, S. 1-15 hr.

Statistics

Wayne A. Muth, Chairperson of Department

311 Knapp Hall

Degree Offered: Master of Science

The Department of Statistics and Computer Science offers a master of science with a major in statistics. The master of science degree is intended to qualify the student to assume a professional role in an educational, industrial, or governmental research project, to teach in a junior or senior college, or to undertake advanced training toward a doctorate in statistics or one of the quantitative fields of science.

Because many students receive baccalaureate degrees from colleges which do not offer undergraduate programs in statistics and because historically statistics has been primarily a field of graduate education, a student does not need a degree in statistics to enter the M.S. degree program in statistics. In fact, a good background in engineering, mathematics, or science is a reasonable preparation for graduate work in statistics.

Options

Two options are available for students seeking a master of science in statistics. The two options are:

- Problem Report Option: At least 36 hours of course work including three hours of credit for a problem report.

- Thesis Option: At least 30 hours of course work including six hours of credit for a thesis.

Prerequisites

Students are expected to know the material contained in the following courses upon admission to the program. Otherwise, these deficiencies must be removed as early as possible in the student's degree program. Otherwise, in order to stay in the program,

these deficiencies must be removed on the terms specified by the admission committee.

- Single and multivariable calculus (MATH 15, 16, 17 or equiv.)
- Linear or matrix algebra (MATH 241 or equiv.)
- Probability and statistics (STAT 201 or equiv.)
- Programming (CS 15, 16 or equiv.)

Minimum required courses for either option are:

- STAT 361, 362, 396.
- Fifteen hours from STAT 312, 313, 341, 351, 371, 381.
- One course from STAT 441, 451.
- One course from STAT 390, 392.

Credit towards the degree requirements is not given for STAT 311.

Examinations

Students must pass two written comprehensive examinations on foundation material and a final oral examination on the thesis or problem report. One comprehensive examination covers the theory taught in STAT 361 and 362; the other covers the applications taught in STAT 312, 313, 341, 351, and 381. These written examinations are normally given in the first four weeks of the semester in which the student expects to graduate. The final oral examination is a defense of the graduate research project required of all students, and it is usually given within four weeks after the student has presented an acceptable copy of the thesis or report to the advisor and graduate committee.

More information concerning graduate studies may be found in *Graduate Programs in Statistics* available from the Department of Statistics and Computer Science.

Requirements for Minor

Any student pursuing a master's degree in the College of Arts and Sciences may complete a minor in statistics by completing the following requirements:

- Prerequisite one year of calculus equivalent to MATH 15 and 16; knowledge of a high-level programming language;
- One six-hour sequence in statistical theory from STAT 261 *Theory of Probability* and STAT 262 *Theory of Statistics* or STAT 361 *Theory of Statistics 1* and STAT 362 *Theory of Statistics 2*.
- An additional six hours of statistics selected from the following courses:

STAT 231 <i>Sampling Methods</i>	3 hours
STAT 312 <i>Statistical Methods 2</i>	3 hours
STAT 313 <i>Design of Experiments</i>	3 hours
STAT 341 <i>Applied Multivariate Analysis</i>	3 hours
STAT 351 <i>Applied Regression Analysis</i>	3 hours
STAT 371 <i>Introduction to Exploratory Data Analysis</i>	3 hours
STAT 381 <i>Nonparametric Statistics</i>	3 hours
STAT 441 <i>Multivariate Statistical Theory</i>	3 hours
STAT 451 <i>Linear Models</i>	3 hours

• A grade of C or better in all courses completed and a minimum 3.0 GPA for all courses used to fulfill the requirements of a minor in statistics.

• The student's graduate committee must include a member of the faculty of the Department of Statistics and Computer Science.

• The problem report or thesis must include a significant application of statistics or otherwise demonstrate the application of statistical techniques to a research problem.

Doctor of Philosophy

A student pursuing a doctor of philosophy in the Eberly College of Arts and Sciences may complete a minor in statistics by satisfying the following requirements:

- Prerequisites of three semesters of calculus equivalent to MATH 15, 16, and 17; knowledge of a high-level programming language equivalent to completing CS 15.
- Six hours of statistical theory by completing STAT 361 *Theory of Statistics 1* and STAT 362 *Theory of Statistical Theory 2*.
- Twelve hours selected from these courses:

STAT 312 <i>Statistical Methods 2</i>	3 hours
STAT 313 <i>Design of Experiments</i>	3 hours
STAT 341 <i>Applied Multivariate Analysis</i>	3 hours
STAT 351 <i>Applied Regression Analysis</i>	3 hours
STAT 371 <i>Introduction to Exploratory Data Analysis</i>	3 hours
STAT 381 <i>Nonparametric Statistics</i>	3 hours
STAT 441 <i>Multivariate Statistical Theory</i>	3 hours
STAT 451 <i>Linear Models</i>	3 hours

• A grade of C or better in all courses, and a GPA of 3.0 for all courses used to meet the requirements of the minor.

• The student's graduate committee must include a member of the faculty from the Department of Statistics and Computer Science.

- Statistics must be one of the areas included in the comprehensive examinations.

Statistics (STAT)

201. *Introduction to Probability and Statistics*. I, II. 3 hr. PR: MATH 16. Probability, random variables, discrete and continuous probability distributions, joint probability distributions, expected value. The central limit theorem. Point and interval estimation and tests of hypotheses. Chi-square tests, linear regression, and correlation.

205. *Introductory Probability and Statistical Inference*. I. 3 hr. PR: Math 128 or equiv. Probability, random variables, expectation, random sampling, descriptive statistics, sampling distributions, estimation, hypothesis testing, linear regression, nonparametric statics.

212. *Intermediate Statistical Methods*. I, II. 3 hr. PR: STAT 101 or 201 or equiv. Extension of basic concepts of statistical inference: estimation and hypothesis testing for more than two populations, multiple regression and correlation, curvilinear regression, analysis of variance and covariance.

213. *Introductory Design and Analysis*. II. 3 hr. PR: STAT 212. Introduction to the linear model, the complete and fractional factorial experiment, and the completely random, randomized complete block, Latin square, and split-plot experimental designs.

221. *Statistical Analysis System (SAS)*. I, II. 3 hr. PR: STAT 101 or 201 or equiv., and CS 1 or equiv. Introduction to the use of the Statistical Analysis System (SAS), a statistical computer program. Students will perform statistical data analysis, data file modifications, and statistical report writing.

231. *Sampling Methods*. I. 3 hr. PR: STAT 101 or 201 or equiv. Methods of sampling from finite populations, choice of sampling unit, and sample survey design. Estimation of confidence limits, and optimum sample size. Single and multistage sampling procedures.

251. *Data Analysis*. II. (Alternate Years.) 3 hr. PR: STAT 213. Computer analyses of simulated or real unbalanced data using a matrix approach to linear models. The techniques will

include least squares analysis of variance and covariance, multiple and polynomial regression, and multiple discrimination.

261. *Theory of Probability*. I. 3 hr. PR or Conc.: MATH 17. Theoretical coverage of probability, random variables, discrete and continuous probability distributions. Expected value, moment generating functions, special probability distributions. Random sampling and distributions of certain functions of random variables. The Central Limit Theorem.

262. *Theory of Statistics*. II. 3 hr. PR: STAT 261. Theoretical introduction to statistical inference. Properties of estimators and techniques of estimation. Hypotheses testing including the Neyman-Pearson Lemma and likelihood ratio tests. Regression and correlation. Selected topics.

291. *Topics in Statistics*. I, II, S. 3 hr. PR: STAT 201 or equiv. Advanced study of special topics in statistics.

305. *Foundations of Probability and Statistics*. S. 3 hr. PR: Math 16 or consent. Probability, random variables, discrete and continuous probability distributions, point and interval estimation, chi-square tests, linear regression, and correlation.

311. *Statistical Methods 1*. I, II. 3 hr. PR: MATH 3. Statistical models, distributions, probability, random variables, tests of hypotheses, confidence intervals, regression, correlation, transformations, F and Chi-square distributions, analysis of variance and multiple comparisons. (Equiv. to ED P 311 and PSYC 311.)

312. *Statistical Methods 2*. I, II. 3 hr. PR: STAT 311 or equiv. Completely random, randomized complete block, Latin square and split-plot experimental designs. Unplanned and planned multiple and orthogonal comparisons for qualitative and quantitative treatments and factorial arrangements. Multiple linear regression and covariance analysis. (Equiv. to ED P 312 and PSYC 312.)

313. *Design of Experiments*. II. 3 hr. PR: STAT 312 or equiv. Expected mean squares, power of tests and relative efficiency for various experimental designs. Fixed, random, and mixed models. Use of sub-sampling, covariance and confounding to increase power and efficiency.

341. *Applied Multivariate Analysis*. I. 3 hr. PR: STAT 311 or equiv. Introduction to Euclidean geometry and matrix algebra; multiple and multivariate regression including multiple and canonical correlation; the k-sample problem including discriminant and canonical analysis; and structuring data by factor analysis, cluster analysis, and multidimensional scaling.

351. *Applied Regression Analysis*. I. 3 hr. PR: STAT 312. Matrix approach to linear and multiple regression, selecting the "best" regression equation, model building, and the linear models approach to analysis of variance and analysis of covariance.

361. *Theory of Statistics 1*. I. 3 hr. PR: MATH 17. Probability and random variables, univariate and multivariate distributions, expectations, generating functions, marginal and conditional distributions, independence, correlation, functions of random variables including order statistics, limiting distributions, and stochastic convergence.

362. *Theory of Statistics 2*. II. 3 hr. PR: STAT 361. Techniques of point and interval estimation, properties of estimates including bias, consistency, efficiency, and sufficiency;

hypothesis testing including likelihood ratio tests and Neyman-Pearson Lemma; Bayesian procedures, analysis of variance and nonparametrics.

371. *Introduction to Exploratory Data Analysis*. I. (Alternate Years.) 3 hr. PR: An introductory statistics course. Basic ways in which observations given in counted and measured form are approached. Pictorial and arithmetic techniques of display and discovery. Methods employed are robust, graphical, and informal. Applications to social and natural sciences.

381. *Nonparametric Statistics*. II. 3 hr. PR: STAT 311 or equiv. Distribution-free procedures of statistical inference. Location and scale tests for homogeneity with two or more samples (related or independent); tests against general alternatives.

390. *Teaching Practicum*. I, II. 1-3 hr. PR: Consent. Supervised practice in college teaching of statistics.

391. *Advanced Studies in Statistics*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced statistics subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

392. *Analysis of Experiments*. II. 1 hr. PR: Consent. Statistical consulting and data analysis.

396. *Graduate Seminar*. I, II. 1 hr. PR: Consent. It is anticipated that each graduate student will present at least one seminar to the assembled faculty and student body in statistics.

397. *Research in Statistics*. I, II, S. 1-15 hr. PR: Consent.

441. *Multivariate Statistical Theory*. II. (Alternate Years.) 3 hr. PR: STAT 341, 361 or consent. Euclidean vector space theory and matrix algebra, multivariate normal sampling theory, the theory of the multivariate general linear hypothesis including multivariate regression, MANOVA, and MANCOVA, and the theory of factor analysis.

451. *Linear Models*. II. (Alternate Years.) 3 hr. PR: STAT 351, 362. Multivariate normal distribution, distribution of quadratic forms, linear models, general linear hypotheses, experimental design models, components of variance for random effects models.

Center for Women's Studies

Helen M. Bannan, Director
218 Eiesland Hall

The Center for Women's Studies has a university-wide mission to coordinate interdisciplinary teaching and research on women and gender. The Center sponsors lectures, films, colloquia, symposia, conferences, faculty development programs, and scholarships. A resource library in the Center supplements the women's studies holdings of other campus libraries. The Center is supported by the West Virginia Alliance for Women's Studies, a community-based group that promotes women's studies and women's education throughout the state.

Although there is currently no independent graduate degree in women's studies available at West Virginia University, students interested in doing graduate work in women's studies can apply for admission to the master of arts in liberal studies program (M.A.L.S.), offered through the Eberly College of Arts and Sciences. This interdisciplinary program provides an opportunity for students to develop their course work and project in the framework of women's studies scholarship. Interested students should become familiar with the requirements of M.A.L.S. as described on page 163 and contact the M.A.L.S. director before contacting the Center.

Undergraduate Certificate in Women's Studies

Students can also choose to complete an undergraduate certificate in women's studies in conjunction with the M.A.L.S. degree or any other graduate degree. The certificate, a 19-hour program with two required and four elective courses, allows the student to design an individualized certificate or choose to focus on an area of concentration such as Women in the Arts or Women's Health and Sexuality. The certificate constitutes a valuable credential in a variety of careers necessitating an understanding of women's issues. To enroll in the certificate program, students must register with the Program Specialist in the Center for Women's Studies.

Financial Assistance

Some financial assistance is available to students doing graduate work in women's studies. Students who qualify as West Virginia residents are eligible for the Winifred South Knutti Graduate Scholarship in Women's Studies. Teaching assistantships may also be available.

For further information, contact the Center for Women's Studies, 218 Eiesland Hall, P.O. Box 6450, Morgantown, WV 26506-6450. Telephone (304) 293-2339.

In addition to the women's studies courses listed below, other courses focusing on women and gender as well as independent study opportunities are available in several university departments.

Women's Studies (WMST)

240. *Methods and Perspectives in Women's Studies*. I, II, 4 hr. PR: Junior standing or consent. Exploration of theories, perspectives, and methods appropriate to the interdisciplinary study of women and gender.

290. *Independent Study*. I, II, S. 1-6 hr. PR: Consent. Individual study of an issue in women's studies and/or gender studies.

391. *Advanced Topics*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced women's studies' topics. Study may be independent or through scheduled meetings.

397. *Master's Degree Research or Thesis*. I, II, S. 1-9 hr. PR: Consent.

490. *Teaching Practicum*. I, II. 1-3 hr. PR: Consent. Supervised practice in college teaching of women's studies.

491. *Advanced Study*. I, II, 1-6 hr. PR: Consent. Investigation in advanced women's studies' topics. Study may be independent or through scheduled meetings.

College of Business and Economics

Sydney V. Stern, Ph.D., Dean

William S. Reece, Ph.D., Associate Dean

Tom S. Witt, Ph.D., Associate Dean

Richard M. Gardner, M.B.A., Assistant Dean

Susan Gustin, M.A., Assistant Dean

Paul J. Speaker, Ph.D., Director of Graduate Programs

The College of Business and Economics was founded in November of 1951 and graduated its first class in the spring of 1953. Since that time, the College of Business and Economics has become one of the largest colleges at West Virginia University. In 1954, the College became fully accredited by the American Assembly of Collegiate Schools of Business, the highest level of business accreditation.

In 1990, the new College of Business and Economics building was completed on the site of Old Mountaineer Stadium on the Downtown Campus adjacent to historic Woodburn Hall. The four-story facility houses modern classrooms, two auditoriums, state-of-the-art computer laboratories, and space for the College's research and service centers.

Our mission centers around educating students to prepare them for professional careers in business, industry, government, and education. The College administration and faculty work with the WVU Career Services Center and private employers to place our graduates in rewarding professional positions.

The master of arts and doctor of philosophy degrees in economics prepare students for careers in business, government, and higher education. Students receive in-depth education in the concepts and methods of economic analysis and also study business analysis, public policy, mathematical economics, labor economics, environmental economics, public finance, and econometrics. These programs are well-suited to students with undergraduate degrees in economics, finance, mathematics, statistics, public policy, history, and other humanities majors.

The master of business administration program is especially attractive for the student with a non-business undergraduate major since no business courses are prerequisite for admission. Course work includes an even exposure to all of the functional areas of management and provides a broad, general management orientation. The M.B.A. program is also available part time on evenings or weekends at various locations throughout West Virginia.

The master of science program in industrial relations provides a flexible, interdisciplinary education for the student desiring a career in human resources management (industrial relations). All undergraduate majors are acceptable. Areas of study may include the functional areas of business, counseling, law, safety, and others.

The master of professional accountancy program is available to students with undergraduate degrees in accounting. The program follows the AICPA's recommendations for a five-year accounting education and meets the requirements of all states with 150-hour requirements for CPA certification. The master's programs can be completed by a full-time student in one to one and a half years. Specific information about graduate programs in the College of Business and Economics may be obtained from Office of Graduate Programs, 333 Business and Economics Building, P.O. Box 6025, West Virginia University, Morgantown, WV 26506-6025. Telephone (304) 293-5408.

Graduate Programs

Business Administration	M.B.A.
Economics	M.A., Ph.D.
Industrial Relations	M.S.
Professional Accountancy	M.P.A.

Overview of Programs

The M.A. and Ph.D. degrees in economics prepare students for careers in business, government, and higher education. Students receive in-depth education in the concepts and methods of economic analysis and also study business analysis, public policy, mathematical economics, labor economics, environmental economics, public finance, and econometrics. These programs are well-suited to students with undergraduate degrees in economics, finance, mathematics, statistics, public policy, history, and other humanities majors.

The M.B.A. program is especially attractive for the student with a non-business undergraduate major since no business courses are prerequisite for admission. Course work includes an even exposure to all of the functional areas of management and provides a broad, general management orientation. The M.B.A. program is also available part time on evenings or weekends at various locations throughout West Virginia.

The master of science program in industrial relations (M.S.I.R.) provides a flexible, interdisciplinary education for the student desiring a career in human resources management (industrial relations). All undergraduate majors are acceptable. Areas of study may include the functional areas of business, counseling, law, safety, sociology, and others.

The master of professional accountancy (M.P.A.) program is available to students with undergraduate degrees in accounting. The program follows the AICPA's recommendations for a five-year accounting education and meets the requirements of all states with 150-hour requirements for C.P.A. certification. The master's programs can be completed by a full-time student in one to one-and-a-half years.

Special Requirements

The M.B.A., M.P.A., and M.S. in industrial relations and the M.A. and Ph.D. in economics programs require a bachelor's degree from an accredited institution. Overall grade point average is considered, with additional attention given to the grade point average achieved in the last sixty hours of course work. The Graduate Management Admissions Test (GMAT) is required for all of the business graduate programs. For the MSIR program, the Graduate Record Examination (GRE) may be substituted for the GMAT. The economics programs require the GRE. A resume is a requirement of the admission process for all programs.

Graduate Faculty

† Indicates regular membership in the graduate faculty.

* Indicates associate membership in the graduate faculty.

Accounting

Professors

*Jay H. Coats, Ph.D. (U. Pitt.). Cost/managerial accounting, Microcomputers in accounting, Accounting education.

*Robert S. Maust, M.S. (WVU), CPA. Financial accounting, Accounting theory, Managerial and cost accounting.

*Adolph A. Neidermeyer, Ph.D. (U. Iowa). Federal and state income taxation, Estate planning, Financial accounting.

- [†]David B. Pariser, Ph.D. (So. Ill.). CPA, CMA, CCA, CGFM. Financial accounting, Governmental accounting and auditing, Public sector accounting, International accounting.
- [†]Ann B. Pushkin, Ph.D. (VPI&SU). CPA. Auditing, EDP auditing, Accounting information systems, Microcomputer applications.
- *Gail A. Shaw, Ph.D. (U. Mo.). CPA, Financial accounting theory, Auditing, Business combinations.
- [†]G. Stevenson Smith, Ph.D. (U. Ark.). CPA, CMA, CCA. Not-for-profit and governmental accounting, Cost accounting, Managerial accounting.

Associate Professor

- [†]Scott I. Jerris, Ph.D. (Purdue U.). Financial accounting, Accounting theory, Capital markets.

Assistant Professors

- [†]Richard C. Brooks, Ph.D. (LSU). CGFM. Managerial accounting, Governmental accounting, Public sector accounting.
- *Bonnie W. Morris, Ph.D. (U. Pitt.). CPA. Accounting information systems, Expert systems and artificial intelligence, Internal audit ing.
- *Timothy A. Pearson, Ph.D. (U. Wisc.). CPA. Auditing, Financial accounting, Microcomputer applications.

Economics

Professors

- [†]Donald R. Adams, Jr., Ph.D. (U. Penn.). American economic history, European economic history, Economic development.
- [†]Luc E. Anselin, Ph.D. (Cornell U.). Regional economics, Econometrics.
- *Robert D. Britt, Ph.D. (U. Colo.). Managerial economics, History of economic thought, Economic history.
- [†]Clifford B. Hawley, Ph.D. (Duke U.). Labor economics, Microeconomic theory, Econometrics.
- [†]Ming-jeng Hwang, Ph.D. (Tex. A&M U.). General theory, Urban and regional economics, Mathematical economics.
- [†]Andrew W. Isserman, Ph.D. (U. Penn.). Regional economics.
- [†]Kern O. Kymn, Ph.D. (U. Chicago). General theory, Mathematical economics, Econometrics.
- [†]Patrick C. Mann, Ph.D. (Ind. U.). Utility economics, Industrial organization.
- [†]Douglas Mitchell, Ph.D. (Princeton U.). Monetary theory, Macroeconomic theory.
- [†]William S. Reece, Ph.D. (Wash. U.—St. Louis). Public economics.
- [†]Tom S. Witt, Ph.D. (Wash. U.—St. Louis). Econometrics, Energy economics, Regional economics.

Adjunct Professors

- [†]Walter C. Labys, Ph.D. (Nottingham U.). Adjunct. Commodity market modeling, Mineral economics, Econometrics.
- *Virgil Norton, Ph.D. (Ore. St. U.). Agricultural economics, Resource economics, Health care.
- [†]Tim T. Phipps, Ph.D. (U. Cal. Davis). Agricultural economics, Resource economics.

Associate Professors

- [†]Ronald J. Balvers, Ph.D. (U. Pitt.). Financial economics, Macroeconomic theory.
- [†]Brian J. Cushing, Ph.D. (U. Md.). Urban and regional economics, Econometrics, Public finance.
- [†]William Trumbull, Ph.D. (UNC). Public finance, Law and economics, Applied microeconomics.

Adjunct Associate Professor

- [†]Victor K. Chow, Ph.D. (U. Ala.). Corporate finance, Portfolio management, Microeconomics.

Assistant Professors

- *Subhayu Bandyopadhyay, Ph.D. (U. Md.). International trade, International finance.
- *Sudeshna Bandyopadhyay, Ph.D. (U. Md.). Labor economics.
- [†]Stratford M. Douglas, Ph.D. (UNC). Econometrics, Industrial organization, Corporate finance.
- *Eun-Soo Park, Ph.D. (Northwestern U.). Microeconomic theory, Game theory.
- [†]Russell S. Sobel, Ph.D. (Fla. St. U.). Public finance.

Finance

Professors

- [†]Howard L. Brewer, Ph.D. (U. Iowa). Financial management, Portfolio applications.
- [†]William B. Riley, Ph.D. (U. Ark.). Investments, Capital markets.
- [†]Frederick C. Scherr, Ph.D. (U. Pitt.). Corporate finance, Capital markets.

Associate Professors

- *Ashok Abbott, Ph.D. (VPI&SU). Financial institutions, Corporate finance, Mergers and acquisitions.
- *Victor Chow, Ph.D. (U. Ala.). Corporate finance, Portfolio management.
- *Karen C. Denning, Ph.D. (U. Pitt.). Corporate finance, Speculative markets, Economic regulation.
- *Terry L. Rose, Ph.D. (U. of Ill.). Insurance, Risk management.
- *Paul J. Speaker, Ph.D. (Purdue U.). Financial institutions, Modeling, Uncertainty.

Management and Industrial Relations

Professors

- *Neil S. Bucklew, Ph.D. (U. Wisc.). Past President. Industrial relations, Collective bargaining, Labor-management relations.
- *Randyl D. Elkin, Ph.D. (Iowa St. U.). Collective bargaining, Arbitration, Health care bargaining.
- *Jack A. Fuller, Ph.D. (U. Ark.). Heuristic decision making, Production planning and control, Systems analysis and design.
- *Ali H. Mansour, Ph.D. (U. Ga.). Management information systems, Management science, Production operations management.
- *Dietrich Schaupp, D.B.A. (U. Ky.). Organizational performance and development, Labor-management cooperation.
- *Fred A. Zeller, Jr., Ph.D. (Ohio St. U.). Labor-management relations, Economic development, Human resources.

Associate Professors

- *Gerald L. Blakely, Ph.D. (UNC). Human resource management, Organizational behavior.
- *Thomas L. Blaskovics, Ph.D. (Marquette U.). Management information systems, Psychological testing.
- *John Harpell, D.B.A. (Ga. St. U.). Operations research, Mentorship, Production management.
- *Cindy L. Martinec, Ph.D. (SUNY-Buffalo). Strategic management.
- *Wilbur J. Smith, M.S. (U. Wisc.). Human resource economics, Employment and training programs, Labor force.
- *Owen A. Tapper, M.S. (U. Wisc.). Trade unionism, Safety and health, Labor-management cooperation.

Assistant Professor

- *Kunal Banerji, (U. Ky.). International business, Policy and strategy.
- *James Denton, Ph.D. (Kent St. U.). Decision science, Operations management.
- *Robert H. Moorman, Ph.D. (Ind. U.). Human resource management, Organizational behavior.
- *Monika Renard, Ph.D. (U. Md.). Human resource management.
- *Michael D. Wolfe, Ph.D. (U. Tex.). Information systems.

Marketing

Professors

- *Cyril M. Logar, D.B.A. (Kent St. U.). Health care marketing, Strategic marketing and planning, Marketing research.
- *Terry Wilson, Ph.D. (Mich. St. U.). Services marketing, Marketing planning.

Associate Professors

- *Paula F. Bone, Ph.D. (U. So. Car.). Consumer behavior, Marketing research, Public policy.
- *Robert W. Cook, D.B.A. (Kent St. U.). Sales management, Product management, Marketing strategy and planning, Retail management.
- *Gordon McClung, Ph.D. (U. Pitt.). Marketing strategy and planning, Services marketing.
- *Thomas Ponzurick, D.B.A. (Memphis St. U.). Health care and services marketing, International marketing, Strategic marketing research.

Assistant Professors

- *Robert Corey, Ph.D. (Penn. St. U.). Channels of distribution, New product development, Direct marketing, Retail management, Business ethics.
- *Karen R. France, Ph.D. (U. Pitt.). Health care and service marketing, Consumer research, Advertising strategy.

Accountancy, Professional

Paul J. Speaker, Director of Graduate Programs

333 Business and Economics Building

Degree Offered:

Master of Professional Accountancy

Given the changing environment in both the public and private sectors of the economy, many accountants will need an educational background that goes beyond that obtained in an undergraduate degree program. Accountants must be proficient in applying professional concepts and principles to a wide variety of existing situations and also have the ability to adapt to new standards and methods of doing business. Competing in such an environment requires a solid technical foundation, an adeptness in analyzing multifarious business situations, and the aptitude to effectively communicate recommended solutions and conclusions. Thus, the objectives of the master of professional accountancy degree are as follows:

- Enhancement of the knowledge base acquired in an undergraduate accounting program with respect to professional concepts, standards, and principles and the ability to apply them.
- Development of higher level critical thinking, problem solving, and other creative skills beyond those attributable to undergraduate education.
- Enhancement of an understanding of ethical, legal, and regulatory issues with respect to business decisions.
- Continued development of an awareness of the impact of the global environment on business decisions.
- Enhancement of skills applicable to analyzing diverse and complex business situations.
- Comprehension and evaluation of the economic, political, and societal effects of accounting techniques and authoritative pronouncements.
- Creation of an attitude conducive to lifelong learning.
- Continued development of listening, writing, and oral communication skills.

Graduates of the MPA program should find employment in industrial, service, governmental entities, and public accounting firms, or attain a background for entry into doctoral programs.

AICPA Guidelines/CPA Exam Requirements

The American Institute of Certified Public Accountants (AICPA) has stated that a CPA candidate should have 150 semester-hours of formal education in order to be prepared to cope with the increasingly complex nature of an accounting practice. Thus, a five-year accounting education will be a membership requirement for the AICPA beginning in the year 2000. Further, 150 semester-hours are required to sit for the CPA examination in many states; this requirement will take effect in West Virginia on July 1, 2000. The MPA program at WVU not only satisfies the 150 hour requirement but also provides a foundation for the student to prepare to sit for professional accounting examinations.

Financial Aid

Financial aid in the form of graduate assistantships and tuition waivers may be available to a limited number of qualified students on a competitive basis. Part time student workers may have the opportunity to work with faculty who teach accounting principles. Graduate students are also eligible for the following awards:

The Accounting Faculty Outstanding M.P.A. Award: To honor an outstanding master of professional accountancy major based on academic performance and contribution to the accounting program.

West Virginia Tax Institute M.P.A. Award: To honor an outstanding master of professional accountancy major, based on academic performance and exceptional service to the accounting department.

Professor and Mrs. Enoch Howard Vickers Graduate Award: To honor an outstanding master of professional accountancy major based on academic performance and contribution to the MPA program.

Program

The M.P.A. program at WVU follows the 150-hour recommendation of the AICPA, as published in its report entitled *Education Requirements for Entry into the Accounting Profession*. The College of Business and Economics is fully accredited by the American Assembly of Collegiate Schools of Business. The graduate courses leading to the M.P.A. degree are intended to be completed in one calendar year of full-time studies. The program requires that the student have an undergraduate degree with a minimum of 24 hours in accounting. Work experience is not a requirement for admission. Students may enter the program on either a full-time or part-time basis in any semester, but fall is the preferred starting date. Careful selection of degree candidates limits the size of classes, leads to high quality efforts in the program, and permits frequent and direct contact between students and faculty.

Admission

To obtain approval for entry into the M.P.A. program, an applicant must have a baccalaureate degree from an accredited college or university. Overall grade-point average is considered, with additional attention given to the grade point average achieved in the last sixty hours of course work and the grade point average in accounting. The Graduate Management Admissions Test is also required. A resume is a requirement of the application process. All applications for approval to enter the M.P.A. program must be received in the WVU Office of Admissions and Records as early as possible and no later than one month before the date for which enrollment is requested.

Prerequisites

To assure that all students in the program have the same foundation in business, the following prerequisite courses, or their equivalent, must be completed before enrolling in M.P.A. graduate courses: principles of accounting (six hours), intermediate accounting (six hours), advanced accounting, cost accounting, tax accounting, auditing, principles of economics (six hours), principles of marketing, principles of management, principles of finance, production management, statistics, business law, business policy, and computer science. A student without the necessary prerequisite courses may be approved to enter the M.P.A. program as a provisional graduate student.

Master of Professional Accountancy

The candidate's program will be planned with the assistance and approval of the director of graduate programs. The M.P.A. degree requires 39 hours of graduate credit and is normally completed in one calendar year. The program of study is as follows:

- Accounting 330 *Financial Accounting Theory and Practice*
- Accounting 333 *Income Taxes and Business Decisions*
- Accounting 391A *Oral/Written Skills for Professionals*
- Accounting 391B *International Dimensions of Accounting*
- Management 303 *Introduction to Management Science*

Accounting 332 *Governmental and Nonprofit Accounting*
Accounting 335 *Computer Systems Auditing*
Economics 318 *Economic Policy*
Finance 321 *Corporate Financial Administration*
Elective Course

Accounting 338 *Controllership*
Accounting 340 *Reporting Practices and Problems*
Accounting 345 *Auditing and Professional Accounting Standards*
Elective Course

No thesis is required in the program, but communication skills are emphasized in all courses. Extensive use is made of microcomputers in accounting applications.

GPA

The M.P.A. program requires that the student maintain a grade-point average of at least 3.0 on all work taken as a graduate student while enrolled in the College of Business and Economics, including prescribed work taken to remove undergraduate deficiencies. A student whose cumulative grade-point average falls below 2.75 will be placed on probation. If the average is not brought up to 2.75 by the end of the following semester, the student will be suspended from the program. A grade below C in more than one course taken while enrolled as a graduate student will result in suspension from the graduate program. Complete information about the M.P.A. program may be obtained by contacting the director of graduate programs.

Accounting (ACCT)

200. *Special Topics*. S. 1-4 hr. PR: ACCT 111 or consent. Special topics relevant to accounting. (Maximum of nine semester hours in any or all courses numbered 200 offered by the College may be applied toward bachelor's and master's degrees.)

210. *Advanced Accounting*. 3 hr. PR: ACCT 112. Accounting for business combinations, consolidations, foreign currency translation, governmental and not-for-profit entities, and equity method investment accounting.

211. *Accounting Systems*. 3 hr. PR: C S 5, ACCT 110 or consent. Coreq.: MANG 101. Analysis of data-processing fundamentals and information systems analysis, design, and implementation, including necessary computer hardware and software components with particular reference to accounting information systems and the controls necessary therein.

213. *Income Tax Accounting*. 3 hr. Conc.: ACCT 111 or 116 or consent. Overview and survey of Federal income tax principles for individuals and simple corporations with emphasis on gross income, exemptions, deductions, capital gains and losses, and tax credits.

214. *Income Tax Accounting*. 3 hr. PR: ACCT 213 or consent. The study of Federal income tax treatment of partnerships, corporations and estates, and the treatment of those property transfers subject to the Federal Gift Tax, together with an introduction to tax research and tax procedure.

217. *Auditing Theory*. 3 hr. PR or Conc.: ACCT 210 or consent. Auditing fundamentals; objectives, ethics, statistical sampling, standards and procedures. Emphasis on FASB and SAS disclosures.

297. *Internship in Accounting*. I, II, S. 1-3 hr. PR: Junior standing and consent. Supervised practical experience in student's major field; identification, analysis, and evaluation of a specific project. (Student, under departmental supervision, arranges internship with sponsoring organization.)

299. *Independent Study*. 1-3 hr.* PR: Consent. Students will develop and complete a program of specialized studies under the supervision of a cooperating instructor. This program may not include credit for internships or employment experience.

311. *Financial Accounting for Decision Making*. 3 hr. PR: Consent. Basic accounting assumptions and standards underlying financial statements, the significance of financial statement measurements, and the relevance of such data for planning and control. Emphasis on financial statement and cash-flow analysis.

321. *Managerial Control*. 2 hr. PR: ACCT 311 or consent. Managerial accounting concepts and techniques used for planning and control. Interpretation and use of internal accounting reports. The use of accounting information in decision making. Emphasis on development of an effective management control system.

325. *Accounting Information Systems*. 2 hr. PR: Consent. The design and use of computerized accounting information systems to support the transaction processing, reporting and decision-making systems of most organizations, including the use and critical analysis of currently available accounting packages.

330. *Financial Accounting Theory and Practice*. 3 hr. PR: ACCT 112. Comprehensive examination of financial accounting theory as established by the opinions, statements and interpretations of professional organizations with special emphasis on their application and problem solving.

332. *Governmental and Nonprofit Accounting*. 3 hr. PR: ACCT 112. Fund accounting and control in governmental and nonprofit entities; identification and control of cost centers; cost analysis and cost finding, and planning and control of operations and resources.

333. *Income Taxes and Business Decisions*. 3 hr. PR: ACCT 213. Advanced federal income-tax problems with emphasis on tax planning for business decisions and tax research methodology.

335. *Computer Systems Auditing*. 2 hr. PR: ACCT 325. The analysis and design of control systems in a computerized accounting environment. Special emphasis on evaluating evidence to determine whether a computing system safeguards assets and maintains data integrity.

338. *Controllanship*. 3 hr. PR: Consent. Examination of the role of the controller in large entities in planning, measuring, evaluating, and controlling performance and in reporting to stockholders and governmental agencies.

340. *Reporting Practices and Problems*. 3 hr. PR: Consent. Evaluation of financial reporting practices and trends, including an examination of the reporting requirements of the SEC and other regulatory agencies. Practitioners will be used extensively for class discussion and presentations.

345. *Auditing and Professional Accounting Standards*. 3 hr. PR: ACCT 217. Professional objectives, principles, and standards of auditing; audit reports and related communications; and case studies of audit sampling, professional ethics, legal liability and reporting.

349. *Seminar*. 3 hr. PR: Consent.

491. *Advanced Study*. 1-6 hr.

Business Administration

Paul J. Speaker, Director of Graduate Programs

333 Business and Economics Building

Degree Offered:

Master of Business Administration

The master of business administration program is accredited by the American Assembly of Collegiate Schools of Business (AACSB) and is the only M.B.A. program in West Virginia so accredited. It is offered as a full-time, day-class program in Morgantown and as a part-time program in Charleston, Morgantown, New Martinsville, Parkersburg, and Wheeling. The standards of excellence that support accreditation by the AACSB are maintained at all instructional sites.

The M.B.A. degree program recognizes the need for a manager of the future to be able to anticipate and recognize change and then to manage resources advantageously in that environment. Thus, the curriculum emphasizes a general, broad-based approach to graduate education in management which provides the student with the qualitative and quantitative skills necessary for a manager to succeed in such an environment. The program develops a managerial perspective that is primarily line as opposed to staff oriented and is relevant to those in both private and public organizations.

Credit Hours

The plan of study requires a total of 48 semester hours of graduate credit. The program is designed for individuals with varying educational and professional backgrounds. No prior course work in business administration is required as a condition of admission to the program. No master's thesis is required for completion of the degree.

The full-time M.B.A. degree program is completed in 13 1/2 months of full-time study on the Morgantown campus. A full-time student can enter the program only on July 1 of each year and graduates in mid-August of the following year. Students may enter the part-time M.B.A. program in designated semesters. A minimum of two and a half years is required for the part-time student to complete the program.

Admission

Full-time To gain admission to the full-time M.B.A. program, an applicant must have a bachelor's degree from an accredited institution. The full-time M.B.A. program is designed for students with non-business undergraduate majors. Admissions decisions are based on an assessment of expected success in the program shown by the application materials and on space available. The admissions committee considers grade point average in all previous college-level work and also the grade point average in the last 60 hours of course work. The Graduate Management Admissions Test (GMAT) is required. Each applicant must submit a resume with the application. The admissions committee takes no action on an application for admission to the full-time program until the applicant submits a GMAT score.

Part-time To gain admission to the part-time M.B.A. program, an applicant must have a bachelor's degree in any discipline from an accredited institution. The Graduate Management Admissions Test (GMAT) is required. Applicants may, however, gain provisional admittance to the part-time program for one semester only prior to taking the GMAT. Each applicant must submit a resume showing prior work experience. Admissions decisions are based on assessments of expected success in the program as shown by the application materials and on space available. For applicants with less than five years of work experience, the GMAT and the undergraduate record provide the strongest indicators of success. For applicants with five or more years of experience, the admissions committee will place greater emphasis on the work history. For applicants with masters or doctoral degrees, the admissions committee may waive the GMAT requirement.

Transcripts and Deadlines

Applications for admission to the M.B.A. program and official transcripts of all prior academic work should be submitted to the WVU Office of Admissions and Records as early as possible. Applicants who have attended institutions other than WVU must request the registrar or records office of those institutions to forward a complete official transcript directly to the WVU Office of Admissions and Records. For the full-time program, the deadline for receipt of applications and transcripts in the College's Office of Graduate Programs is March 1. For the part-time program, the deadline is one month prior to the starting date requested. Admission to the program is competitive and subject to space being available.

Financial Aid

A limited number of graduate assistantships and tuition waivers are available to full-time students on a competitive basis. Graduate assistants are paid a cash stipend during the regular semesters that is competitive in amount with that offered by other universities; graduate assistants are assigned to faculty members to assist in research, teaching, and other academic endeavors. University scholarships are available on a competitive basis to minority students. Additional information and application forms can be obtained from the director of graduate programs.

M.B.A. Program

The M.B.A. degree program requires 48 hours of graduate credit, including the following courses:

Accounting 311 *Financial Accounting for Decision Making*
Accounting 321 *Managerial Control*
Business Law 311 *Legal and Regulatory Environment*
Economics 317 *Economic Decision Making*
Economics 318 *Economic Policy*
Economics 319 *Applied Business and Economics Statistics*
Finance 311 *Managerial Finance*
Finance 321 *Corporate Financial Administration*
Management 301 *Organizational Behavior and Ethics*
Management 303 *Introduction to Management Science*
Management 311 *Management Information Systems*
Management 321 *Operations Management/Applied Quantitative Analysis*
Management 325 *Seminar in Organizational Processes*
Management 351 *Policy and Strategy*
Marketing 311 *Marketing Management*
Marketing 321 *Marketing Strategy*
Seminar
Seminar

Selected graduate courses may be waived depending on an individual's undergraduate degree and the recency of the degree; however, other graduate courses must be substituted for waived courses. Specific course offerings and requirements may have changed since this book was printed. Please contact the director of graduate programs for the current program description.

Academic Standards

The M.B.A. requires that the candidate achieve a cumulative grade-point average of at least 3.0 on all work counting toward the graduate degree. A regular graduate student whose cumulative grade-point average falls below 2.75 will be placed on probation. If the average is not brought up to 2.75 by the end of the following semester, the student will be suspended from the program. A grade below C in more than one course taken while enrolled as a graduate student will result in suspension from the program. In addition, the student must maintain a 3.0 average in all work counting toward the graduate degree.

Part-time Program

Students in the part-time program are subject to the same requirements and restrictions as students enrolled in the full-time program. Classes in the part-time program are taught by graduate faculty members in the College. The M.B.A. part-time program is offered in its entirety in Charleston, Morgantown, New Martinsville, Parkersburg, and Wheeling. Weekend classes normally meet on Friday evenings (7:00 to 10:00) and Saturdays (9:00 A.M. to 2:00 P.M. or 9:00 A.M. to 4:00 P.M.). A three semester-hour course normally meets for five weekends and a two semester-hour course for three weekends. Weekend classes may have examinations scheduled on weekday evenings. Weekday classes normally meet one or two evenings per week and on occasional Saturdays.

Accounting (ACCT)

210. *Advanced Accounting*. 3 hr. PR: ACCT 112. Accounting for business combinations, consolidations, foreign currency translation, governmental and not-for-profit entities, and equity method investment accounting.

211. *Accounting Systems*. 3 hr. PR: C S 5, ACCT 110 or consent. Coreq.: MANG 101. Analysis of data-processing fundamentals and information systems analysis, design, and implementation, including necessary computer hardware and software components with particular reference to accounting information systems and the controls necessary therein.

213. *Income Tax Accounting*. 3 hr. PR: ACCT 111 or 115 or 116 or consent. Tax laws and the investment and business decisions they affect. Taxes are presented in meaningful relationships in order to form a general pattern of knowledge that is easier understood.

214. *Income Tax Accounting*. 3 hr. PR: ACCT 213 or consent. The study of federal income tax treatment of partnerships, corporations and estates, and the treatment of those property transfers subject to the Federal Gift Tax, together with an introduction of tax research and tax procedure.

217. *Auditing Theory*. 3 hr. PR or Conc.: ACCT 210. Auditing fundamentals; objectives, ethics, statistical samplings, standards and procedures. Emphasis on FASB and SAS disclosures.

230. *Advanced Accounting Theory*. 3 hr. PR: ACCT 112, 115, and consent. Critical analysis of accounting concepts and standards with emphasis on their origin, development, and significance.
297. *Internship in Accounting*. I, II, S. 1-3 hr. PR: Junior standing and consent. Supervised practical experience in student's major field; identification, analysis, and evaluation of a specific project. (Student, under departmental supervision, arranges internship with sponsoring organization.)
311. *Financial Accounting for Decision Making*. 3 hr. PR: Consent. Basic accounting assumptions and standards underlying financial statements, the significance of financial statement measurements, and the relevance of such data for planning and control. Emphasis on financial statement and cash-flow analysis.
321. *Managerial Control*. 2 hr. PR: ACCT 311 or consent. Managerial accounting concepts and techniques used for planning and control. Interpretation and use of internal accounting reports. The use of accounting information in decision making. Emphasis on development of an effective management control system.
325. *Accounting Information Systems*. 2 hr. PR: Consent. The design and use of computerized accounting information systems to support the transaction processing, reporting and decision-making systems of most organizations, including the use and critical analysis of currently available accounting packages.
330. *Financial Accounting Theory and Practice*. 3 hr. PR: ACCT 112. Comprehensive examination of financial accounting theory as established by the opinions, statements and interpretations of professional organizations with special emphasis on their application and problem solving.
332. *Governmental and Nonprofit Accounting*. 3 hr. PR: ACCT 112. Fund accounting and control in governmental and nonprofit entities; identification and control of cost centers; cost analysis and cost centers; cost analysis and cost finding, and planning and control of operations and resources.
333. *Income Taxes and Business Decisions*. 3 hr. PR: ACCT 213. Advanced federal income-tax problems with emphasis on tax planning for business decisions and tax research methodology.
335. *Computer Systems Auditing*. 2 hr. PR: ACCT 325. The analysis and design of control systems in a computerized accounting environment. Special emphasis on evaluating evidence to determine whether a computing system safeguards assets and maintains data integrity.
338. *Controllorship*. 3 hr. PR: Consent. Examination of the role of the controller in large entities in planning, measuring, evaluating, and controlling performance and in reporting to stockholders and governmental agencies.
340. *Reporting Practices and Problems*. 3 hr. PR: Consent. Evaluation of financial reporting practices and trends, including an examination of the reporting requirements of the SEC and other regulatory agencies. Practitioners will be used extensively for class discussion and presentations.

345. *Auditing and Professional Accounting Standards*. 3 hr. PR: ACCT 217. Professional objectives, principles, and standards of auditing; audit reports and related communications; and case studies of audit sampling, professional ethics, legal liability and reporting.

349. *Seminar in Accounting*. 3 hr. PR: Consent.

491. *Advanced Study*. 1-6 hr.

Business Law (BLAW)

200. *Special Topics*. 1-4 hr. PR: BLAW 112 or consent. Special topics relevant to business law. (Maximum of nine semester hours in any or all courses numbered 200 offered by the College of Business and Economics may be applied toward bachelor's and master's degrees.)

211. *Personnel Relations and the Law*. 3 hr. The legal principles guiding employer-employee relations, including agency law and the law regulating employee health, safety, compensation and benefits, job opportunity, and labor organizing.

213. *Law for the C.P.A.* 3 hr. PR: BLAW 111. A survey of those areas of commercial and regulatory law with which accountants need familiarity in order to exercise good judgment, practice their profession skillfully and understand their professional responsibility. (Credit cannot be received for both BLAW 112 and BLAW 213.)

311. *Legal and Regulatory Environment*. 2 hr. PR: Consent. Examination of the legal environment in which business decisions are made and the response of the legal environment to change. Familiarization with the role of administrative agencies in the regulatory process.

491. *Advanced Study*. 1-6 hr.

Economics (ECON)

317. *Economic Decision Making*. 2 hr. PR: ECON 54 or consent. (Primarily for M.B.A. students.) Analysis of the firm as an optimizing unit operating in the market place. Examination of product demand, production and costs, pricing theory and practices, risk, and capital budgeting.

318. *Economic Policy*. 2 hr. PR: ECON 317 or consent. (Primarily for M.B.A. and M.P.A. students.) Microeconomic analysis of macroeconomic phenomena is considered with particular attention paid to the reaction by firms to price and interest rate effects of fiscal and monetary policy.

319. *Applied Business and Economics Statistics*. 3 hr. PR: Consent. Primary statistical methods used in business and economics research including hypothesis testing, estimation, linear regression, time series, and business forecasting. Statistical computer software is an integral part of the course.

Finance (FIN)

200. *Special Topics*. 1-4 hr. PR: FIN 111, or FIN 311, or consent. Special topics relevant to finance.

212. *Working Capital Management*. 3 hr. PR: FIN 111 or 311, FIN 112, ECON 125. Management of current assets and liabilities. Topics include management of cash, market-

able securities, accounts receivable, inventories, trade accounts payable, and short-term bank borrowings. Decision models are used extensively.

216. *Risk Management*. 3 hr. PR: FIN 115 or consent; PR or Coreq.: FIN 112. Transferable risks with which the entrepreneur must deal. Emphasis on the process by which decisions are made for handling these risks, including an examination of contributions and limitations of insurance system.

217. *Employee Benefit Plans*. 3 hr. PR: FIN 115 or consent. Use, design, and regulation of group life insurance, health care and pensions, including their federal tax consequences. Study of the available contracts in each area and financing alternatives and practices.

218. *Life Insurance and Estate Planning*. 3 hr. PR: FIN 115. Principles of life and health insurance protection; application of life insurance to individual, family, business, and societal needs; study of trusts, wills, and estates, integrating of income into estate management.

219. *Property and Liability Insurance*. 3 hr. PR: FIN 115. Study of the use and production of property and liability insurance, including evaluation of insurance contracts and current insurance practices; legal and regulatory environment affecting use and production of insurance.

220. *Social Insurance*. 3 hr. PR: FIN 115 or consent. Our social and political efforts to provide economic security for the general public. An examination of the parallel developments of private insurance.

250. *Security Analysis and Portfolio Management*. 3 hr. PR: FIN 150 or consent; PR or Coreq.: FIN 112. The systematic selection, assessment, and ranking of corporate securities in a portfolio framework through a synthesis of fundamental analysis, technical analysis, and random walk.

251/331. *Bank Management*. 3 hr. PR: FIN 111 or consent; PR or Coreq.: FIN 112. (May not be taken for both undergraduate and graduate credit.) Management of bank funds. Principles of organization lending and investment. Policy relationships to bank productivity, organization, and profitability; preparation of financial reports; management of a simulated bank in a changing environment.

252. *Advanced Bank Management*. 3 hr. PR: FIN 251 or consent. An advanced course in commercial banking involving problems of management of the money position, loan and investment portfolio, and capital adequacy. The student simulates actual bank operation, conducts case studies, and analyzes bank performance.

311. *Managerial Finance*. 2 hr. PR: Consent. Analysis of the standard financial activities of the firm including: financial planning, structure of financing, and asset selection. Introduction to microcomputer problem solution.

321. *Corporate Financial Administration*. 3 hr. PR: FIN 111, or FIN 311, or consent. A study of theoretical concepts of corporate financial administration and the application of these concepts to real world case studies.

331. *Bank Management*. 3 hr. PR or Coreq.: FIN 311 or consent. (May not be taken for both undergraduate and graduate credit.) Management of bank funds. Principles

of organization lending and investment. Policy relationships to bank productivity, organization, and profitability; preparation of financial reports; management of a simulated bank in a changing environment. (Same as FIN 251 with the addition of a research paper.)

349. *Seminar in Finance*. 3 hr. PR: FIN 321.

491. *Advanced Study*. 1-6 hr.

Industrial and Labor Relations (ILR)

262. *Collective Bargaining and Labor Relations*. 3 hr. PR: ECON 160 or consent. Examination of the theory and practice of collective bargaining. Topics include economics and historical environment, labor law, unionization, contract negotiation, patterns in contract content, conflict resolution, grievance handling, and an introduction to arbitration.

301. *Industrial Relations Analytical Techniques 1*. 3 hr. PR: Admission to the ILR graduate program and C S 5 or equiv. Introduction to the software and hardware appropriate for use in human resource applications, emphasizing efficient and effective use of previously developed software. Introduction to quantitative analytical decision-making techniques.

302. *Industrial Relations Analytical Techniques 2*. 3 hr. PR: Admission to the ILR graduate program. Further development of the quantitative analytical techniques and of business information systems used in the human resources field. Emphasis on quantitative decision-making and information systems in an industrial relations setting.

310. *Human Resources Economics*. 3 hr. PR: Admission to the ILR graduate program. Consideration of the conditions of employment and unemployment at both macro and micro levels under varying degrees of competition, including the process of labor force preparation, labor market data and policy.

312. *Organizational Theory, Behavior, and Communication*. 3 hr. PR: Consent. Emphasis on the communication processes involved in problem resolution including organizational decision making. Problems include organizational evaluation methods, training and leadership development, staffing, evaluation of proficiency of individuals, systems, and procedures.

314. *Industrial Relations Strategy and Policy*. 3 hr. PR: Consent. Explores the integrative dimensions of organizational policies and their relationship to the personnel and industrial relations function. Business ethics in the industrial relations function.

316. *Labor Organization Industrial Relations*. 3 hr. PR: Consent. Introduction to dynamics (adversary/cooperative) of industrial relations from a union viewpoint. Topics include conflict resolution, union government, alternatives to economic conflict bargaining, interaction, the state of industrial relations and work society.

330. *Compensation Issues*. 3 hr. PR: Consent. Seminar in compensation designed to develop further understanding of compensation theory and practice. Topic areas will include labor supply, wage theory, legal constraints, motivation, equity theory, organizational development as well as compensation structure and administration.

332. *American Trade Unionism*. 3 hr. PR: ILR 262 or 316 or consent. Examines the rise of American unionism and traces historical factors shaping its philosophy. Topics include

economic conditions and union history, comparisons of AFL and CIO structures and the AFL-CIO as a government.

333. *Seminar: Quality of Work Life*. 3 hr. PR: Consent. Analysis of current trends and approaches in "quality of work life improvement" with special attention to developments in participative management, job enrichment and gain sharing. Results of current research are featured.

334. *Work Group Dynamics and Leadership*. 3 hr. PR: Consent. Small group or individual research on topics related to leadership and group dynamics in the work environment including training and other human relations programs.

337. *Practicum in Industrial Interviewing*. 3 hr. PR: ILR 312 and consent. Experiential learning of industrial interviewing techniques covering legal and technical aspects of employment interviewing and other types of interviewing.

340. *Arbitration Theory and Practice*. 3 hr. PR: ILR 262 and consent. Study of the purpose of arbitration, trends, principles of contract construction, hearing procedure evidence, remedies, training and education of arbitrators, training of advocates, and decision writing. Students will arbitrate mock cases.

342. *Advanced Collective Bargaining*. 3 hr. PR: ILR 262 or consent. Development of the economic theory, empirical analysis and policy implications of the impact of collective bargaining on wages, employment, market structure, and prices.

344. *Benefits*. 3 hr. Considers employee benefits from the perspective of the industrial relations specialist who is responsible for articulating and administering a corporate program. Includes study of all benefits covered by major federal legislation.

345. *Equal Employment Opportunity Problems*. 3 hr. PR: Consent. A series of lectures by specialists in equal employment opportunity affairs. Lecturers will include attorneys, directors of state and national EEO agencies, and representatives of business and industry and the labor movement.

491. *Advanced Study*. 1-6 hr.

497. *Research*. 1-15 hr.

Management (MANG)

201. *Business Information Systems*. 3 hr. PR: MANG 101 and 105 or consent. Use of EDP for management control and decision making with emphasis on application in the functions of finance, marketing, personnel, accounting, and operations management. 3 hr. lec.

206. *Organizational Theory and Analysis*. 3 hr. PR: MANG 105 or consent. Influences of structure on the behavior and dynamics of the business organization. Attention on how to be an effective manager.

211. *Advanced Production Management*. 3 hr. PR: MANG 111. Integration of quantitative techniques and their application to production problems. Utilizes cases and projects.

212. *Management Science*. I. 3 hr. PR: MANG 105. The study and application of quantitative methods to business problems in which deterministic conditions prevail.

216. *Personnel Management*. 3 hr. PR: MANG 105. Fundamental principles and practices related to the procurement, development, maintenance and utilization of human resources. Focus on areas such as human resource planning, selection, training, performance appraising, compensation, safety and health, and labor relations.

217. *Personnel and Compensation*. 3 hr. PR: MANG 216 or consent. Designing and implementing total compensation systems in both private and public sectors. The emerging elements of total compensation systems are included providing insights into problems and opportunities for personnel.

220. *Human Resource Management Research Methods*. 3 hr. PR: MANG 205 and 216 or consent. Research methods and measurement in human resource management; philosophy of science, ethics in research, research design, and analytical methods.

222. *Management Science*. II. 3 hr. PR: MANG 212 or consent. The study and application of quantitative methods to business problems in which probabilistic conditions prevail.

230. *Entrepreneurship*. 3 hr. PR: Consent. The role of the entrepreneur in business and society; includes an analysis of the individual entrepreneur, and investigates the nature and problems of establishing a new business enterprise.

260. *Practicum in Small Business*. 3 hr. PR: Consent. A practical training ground in the identification and solution of small business problems. Through interaction with the business community, students are exposed to the opportunities and difficulties of small business entrepreneurship.

297. *Internship in Management*. I, II, S. 1-3 hr. PR: Junior standing and consent. Supervised practical experience in student's major field; identification, analysis, and evaluation of a specific project. (Student, under departmental supervision, arranges internship with sponsoring organization.)

301. *Organizational Behavior and Ethics*. 3 hr. PR: Consent. Interpersonal relationships through which administration becomes effective. Emphasis on human factors, but influences of economic and technological factors also are considered. Focus on ethics and importance of harmony between individual needs and organization goals.

303. *Introduction to Management Science*. 3 hr. PR: Consent. Study of management science models and techniques with applications in business decision-making problems. Coverage includes mathematical programming models, decision theory, simulation, network models, and other current management science topics.

311. *Management Information Systems*. 3 hr. PR: Consent. Examines computer technology, applications, information systems, and performance. Computer system planning, selection and implementation. Computer impact upon management, organization, and society from a managerial viewpoint.

321. *Operations Management/Applied Quantitative Analysis*. 3 hr. PR: Consent. Review of concepts, techniques, and models encountered in manufacturing and service operations. Modeling approach and computer applications in operations management and management science are emphasized.

325. *Seminar in Organizational Processes*. 3 hr. PR: Consent. Examination of the dynamics of the successful organization. Emphasis on the organization as an institution and the role of the manager in the organization. Implications of international competition will be addressed.

349. *Seminar in Management*. 1-6 hr. PR: Consent. In-depth study of important management issues.

351. *Policy and Strategy*. 3 hr. PR: Consent. Capstone course. Integrates functional knowledge with strategy formulation and strategy implementation concepts. Cases of organizations varying in size, national affiliation, and profit orientation are analyzed with special emphasis on ethics and social responsibility.

491. *Advanced Study*. 1-6 hr.

Marketing (MKTG)

203. *Sales Management*. 3 hr. PR: MKTG 111 or consent. Concentrates on the managerial responsibilities of sales managers for directing, motivating, and controlling a sales force plus the techniques of selling including handling objections and closing.

205. *Consumer Behavior*. 3 hr. PR: MKTG 111 or consent. The consumer decision process in a marketing framework. Emphasis on psychological and sociological concepts which influence the decision process.

207. *Business Logistics Management*. 3 hr. PR: MKTG 115 or consent. Examination of transportation, warehousing, materials handling, containerization, inventory control, purchasing, and warehouse location. Significant use made of problem solving with analytical tools.

210. *Business to Business Marketing*. 3 hr. PR: MKTG 111 or consent. A study of marketing to three classes of customers: the industrial market, the institutional market, and governmental agencies.

297. *Internship in Marketing*. I, II, S. 1-3 hr. PR: Junior standing and consent. Supervised practical experience in student's major field; identification, analysis, and evaluation of a specific project. (Student, under departmental supervision, arranges internship with sponsoring organization.)

311. *Marketing Management*. 2 hr. Introduction to marketing management with specific emphasis on consumer behavior and market segmentation, product planning, promotion, distribution, and pricing.

321. *Marketing Strategy*. 3 hr. PR: MKTG 311. Emphasis on formulating a marketing strategy and developing analytical and decision-making capabilities. Cases will be used to illustrate specific business situations.

349. *Seminar in Marketing*. 3 hr.

491. *Advanced Study*. 1-6 hr.

Economics

William Trumbull, Chairperson, Department of Economics

420 Business and Economics Building

Degrees Offered:

Master of Arts, Doctor of Philosophy

The master of arts and doctor of philosophy degrees in economics enable students to broaden and refine their knowledge of the concepts and methods of economic analysis. These programs are designed to prepare students for careers in business, government, and higher education. Student programs are planned with the assistance of a faculty advisor and approval of the Director of Graduate Programs. Additional information about the graduate programs in economics, and the regulations and requirements pertaining to them, may be obtained by securing a copy of *Graduate Programs in Economics* from the graduate director. Students are bound by these regulations and requirements, as well as those of the College of Business and Economics.

Prerequisites

To be admitted as a regular student, applicants must have a grade-point average of 3.0 or better for all undergraduate work completed and a minimum combined score of 1500 for the three parts of the general aptitude portion of the Graduate Record Examination. All students must submit their scores on the general aptitude portion of the Graduate Record Examination (GRE) and international students must also submit their scores on the TOEFL. In addition, it is required that all applicants will have completed at least one semester of each of the following courses: intermediate microeconomic theory, intermediate macroeconomic theory, calculus, and statistics. Applicants not meeting these entrance requirements may be admitted on a provisional and/or deficiency basis, subject to certain performance conditions during their first semester in residence.

Assistantships

A limited number of graduate assistantships and tuition scholarships are available on a competitive basis to full-time students. Major selection criteria include prior academic performance and GRE scores. Graduate assistants receive a cash stipend that is comparable in amount to that offered at other universities. Graduate assistants engage in research and/or teaching activities. The faculty of the Department of Economics also nominates outstanding applicants for University fellowships. Special scholarships are also available on a competitive basis to minority students. Further information and applications can be obtained from the Director of Graduate Programs.

Academic Standards

To qualify for a graduate degree in economics, students must earn a cumulative grade-point average (GPA) of 3.0 or better for all courses completed as a graduate student at WVU. A regular graduate student in economics whose cumulative GPA falls below 3.0 (B) upon completion of the first nine hours of graduate study is not in good standing and will be placed on probation. A student in the program whose cumulative GPA falls below 3.0 will be placed on probation as of the close of the semester in which the GPA fell below 3.0. Such a student, placed on probation, who fails to raise his/her cumulative GPA to 3.0 by the end of the semester succeeding that in which his/her GPA fell below 3.0 is subject to suspension from the program at the end of that probationary semester.

Other academic reasons for suspension from the program include failing grades on more than 50 percent of the course work taken in any semester, a third failure on either

a microeconomic theory or macroeconomic theory comprehensive examination, a fourth failure on comprehensive field examinations, or failure to complete all degree requirements within the specified time limits.

Master of Arts Program

The master of arts program requires a total of 37 hours of graduate credit, including 22 hours of economics. At least 25 hours of course work completed must be at the 300 level. To qualify for the M.A. degree, graduate students in economics must earn a grade of B- or better in Economics 310 and 312, and a grade-point average of 3.0 in all courses attempted as a graduate student at WVU. The M.A. program has a thesis and a non-thesis option.

Specific course requirements include:

Economics 220 <i>Introduction to Mathematical Economics</i>	3 hr.
Economics 310 <i>Advanced Microeconomic Theory 1</i>	4 hr.
Economics 312 <i>Advanced Macroeconomic Theory 1</i>	3 hr.
Economics 316 <i>History of Economic Doctrines and Analysis</i>	3 hr.

If the student has recently successfully completed Economics 216 *History of Economic Thought* or its equivalent before entering the M.A. program, the Economics 316 requirement may be waived.

Statistics Requirement—(six credit hours are required.)

Statistics 231 <i>Sampling Methods</i>	3 hr.
Economics 226 <i>Applied Econometrics</i>	3 hr.

or for students who consider going into the Ph.D. program,

Economics 320 <i>Mathematical Economics</i>	3 hr.
(substitute for Economics 220 in the core)	
Economics 325 <i>Econometrics 1</i>	3 hr.

The student must also select the thesis or non-thesis alternatives:

- Thesis Alternative: An acceptable thesis for six hours is required and the student must pass a final oral examination.
- Nonthesis Alternative: In lieu of a thesis, the requirements for the M.A. are met by completion of two 300-level courses in one field of concentration in economics and submission of a research paper that gives evidence of substantial ability to conduct scholarly research.

Special M.A. Emphases

The M.A. program in economics includes special emphases administered by the College of Business and Economics jointly with other units on campus. These emphases are business analysis, mathematical economics, public policy, and statistics and economics. To earn the M.A. in economics with a special emphasis, students must complete the M.A. requirements (above) and fulfill other requirements pertaining to the particular emphasis. The emphases are best viewed as coherent sample programs developed in conjunction with other units and are designed to prepare students for employment in a particular area or specialty of economics.

Business Analysis Conducted in cooperation with other departments of the College of Business and Economics, the business analysis emphasis is designed to prepare students for employment in the business analysis area. As part of their M.A. program in economics, students complete 13 hours of business courses: *Financial Accounting, Managerial Finance, Corporate Financial Administration, Organizational Behavior and Ethics, and Marketing Management.*

Mathematical Economics The mathematical economics emphasis is conducted in cooperation with the Department of Mathematics. Students entering this emphasis must previously have taken 12 hours in mathematics, including a course in calculus equivalent to MATH 15. Additional requirements are *Advanced Micro Theory 2*, *Advanced Macro Theory 2*, *Econometrics*, *Mathematical Economics*, *Advanced Mathematical Economics*, *Applied Linear Algebra*, and *Introduction to Real Analysis*.

Public Policy The public policy emphasis is conducted in cooperation with the Department of Political Science and provides students with broad training in policy analysis skills and methods. Prior completion of at least six hours of political science course work is required. Additional requirements are *Introduction to Policy Research*, *Public Policy Analysis*, and *Economic Analysis of Public Policies*.

Statistics and Economics Conducted in cooperation with the Department of Statistics and Computer Science, the statistics and economics emphasis is designed to prepare students for employment in the public or private sector that demands the use of quantitative skills. Additional requirements are statistics, probability, applied regression analysis, and econometrics.

Doctor of Philosophy

At least four years of full-time graduate work beyond the baccalaureate degree are usually required to complete the doctorate. A minimum of two consecutive semesters in actual residence as a full-time graduate student is required. To qualify for the doctor of philosophy degree in economics, a student must earn a cumulative grade-point average of 3.0 in courses completed as a graduate student at WVU.

The Ph.D. degree is not awarded for the mere accumulation of course credits nor for the completion of the specified residence requirements. All students are required to complete the graduate core curriculum, prepare themselves in two fields of concentration, and pass at least two additional 300-level courses with grades of B or better. Each student must also submit an acceptable dissertation. A minimum of 48 hours of graduate work in economics at the 300 level is required for all candidates for the Ph.D. degree in economics.

Economics 310 <i>Advanced Microeconomic Theory 1</i>	4 hr.
Economics 311 <i>Advanced Microeconomic Theory 2</i>	4 hr.
Economics 312 <i>Advanced Macroeconomic Theory 1</i>	3 hr.
Economics 313 <i>Advanced Macroeconomic Theory 2</i>	3 hr.
Economics 316 <i>History of Economic Doctrines and Analysis</i>	3 hr.
Economics 320 <i>Mathematical Economics</i>	3 hr.
Economics 325 <i>Econometrics 1</i>	3 hr.
Economics 326 <i>Econometrics 2</i>	3 hr.
Economics 329 <i>Seminar in Econometrics</i>	3 hr.
Economics 409 <i>Research Design and Methodology</i>	1 hr.

Six semester hours (or the equivalent) must be taken in each of the student's two fields of concentration. Areas of concentration include monetary economics, public finance, regional and urban economics, labor economics, international economics, and resource economics. Other fields may also be approved. One of the fields of concentration may be in an outside area; selection must be approved by the graduate economics faculty.

Comprehensive Examinations Students must pass written comprehensive examinations in economic theory (microeconomics and macroeconomics) and in two fields. For detailed rules, see departmental *Graduate Programs in Economics* filed in the Office of Graduate Director.

Candidacy and Dissertation When an applicant has successfully completed all course work and passed the written comprehensive examinations, the applicant will be formally promoted to candidacy for the Ph.D. degree. The candidate must submit a dissertation pursued under the supervision of a member of the graduate faculty in economics on some problem in the area of the candidate's major interest. The dissertation must present the results of the candidate's individual investigation and must embody a definite contribution to knowledge. It must be approved by a committee of the graduate faculty in economics. After approval of the candidate's dissertation and satisfactory completion of other graduate requirements, a final oral examination on the dissertation is required.

Each Ph.D. candidate is required to present a dissertation proposal to the graduate director after approval by at least three members of his or her dissertation committee including the chairperson. This proposal will include a statement of the problem (topic summary), a preliminary survey of the literature, a description of the research methodology, and other pertinent material. With the approval of the graduate director, the student is then required to present the proposal in a faculty-student seminar. Credit for dissertation research and writing is available under Economics 497, but only if the student has a dissertation chairperson and an approved topic.

Ph.D. Emphases

The Ph.D. program includes special emphases conducted in cooperation with other units on campus. These are industrial relations, and mathematical economics. The emphases specify certain concentrations of course work and comprehensive examinations. Acceptable dissertations are required of all students.

Industrial Relations Graduate work in industrial relations typically is interdisciplinary in nature. The Ph.D. emphasis retains the interdisciplinary orientation while providing students with a Ph.D.-level of understanding of economic theory and economic analysis. Students in the industrial relations emphasis take the core courses in the Ph.D. program and take comprehensive examinations in microeconomic and macroeconomic theory.

Students are required to complete two fields of concentration. One field must be industrial relations, which consists of the following courses:

Industrial and Labor Relations 334 *Leadership & Work Group Dynamics*

Industrial and Labor Relations 342 *Advanced Collective Bargaining*

Industrial and Labor Relations 491A *Practicum in Research Methods*

Industrial and Labor Relations 491B *Research Theory*

The remaining field must be from within the Department of Economics. Most commonly, this field is labor economics. Students must pass written comprehensive examinations in their two fields of concentration.

Mathematical Economics The mathematical economics emphasis is conducted in cooperation with the Department of Mathematics. To be admitted into this emphasis, students must have completed a minimum of 12 hours in mathematics, including a course in calculus equivalent to Mathematics 15. In addition to the Economics Ph.D. core, students are required to take the following courses:

Economics 328 *Advanced Mathematical Economics*

Mathematics 241 *Applied Linear Algebra*

Mathematics 251, 252 *Introduction to Real Analysis*

(MATH 251 and 252 may be replaced by MATH 317, 318.)

Mathematics 357 *Calculus of Variations*

Mathematics Elective—3 hr.

Students are required to successfully complete comprehensive examinations in microeconomic and macroeconomic theory, mathematical economics/econometrics, and one other field in economics.

Economics (ECON)

Specialized Courses

200. *Special Topics*. 1-4 hr. PR: ECON 51 or 55 or consent. Special topics relevant to economics. (Maximum of nine semester hours in any or all courses numbered 200 offered by the College of Business and Economics may be applied toward bachelor's and master's degrees.)

297. *Internship*. 1-12 hr. PR: ECON 51 or 55 and departmental approval. Field experience in the analysis and solution of economic problems in the public and private sectors.

317. *Economic Decision Making*. 2 hr. PR: ECON 54 or consent. (Noncredit for Graduate students in Economics.) Analysis of the firm as an optimizing unit operating in the market place. Examination of product demand, production and costs, pricing theory and practice theory and practices, risk and capital budgeting. (Open only to MBA and MSLIR students.)

318. *Economic Policy*. 2 hr. PR: ECON 317 or consent. (Noncredit for graduate students in Economics.) Microeconomic analysis of macroeconomic phenomena is considered with particular attention paid to the reaction by firms to price and interest rate effects of fiscal and monetary policy. (Open only to MBA and MPA students.)

319. *Applied Business and Economics Statistics*. 3 hr. PR: Consent. Primary statistical methods used in business and economics research including hypothesis testing, estimation, linear regression, time series, and business forecasting. Statistical computer software is an integral part of the course. (Open only to MBA, MPA, and MSLIR students.)

343. *Economic Analysis of Public Policies*. 3 hr. Application of economic analysis to questions of public policy. Consideration of problems of public goods and other market failures and usefulness of cost-benefit analysis to policymaking. (Equiv. to POLS 331.)

Economic Theory

211. *Intermediate Microeconomic Theory*. 3 hr. PR: ECON 51 or 54. Consumer choice and demand; economics of time; price and output determination and resource allocation in the firm and market under a variety of competitive conditions; welfare economics, externalities, public goods, and market failure.

212. *Intermediate Macroeconomic Theory*. 3 hr. PR: ECON 51 or 55. Forces which determine the level of income, employment, and output. Particular attention to consumer behavior, investment determination, and government fiscal policy.

216. *History of Economic Thought*. 3 hr. PR: ECON 51, 55. Economic ideas in perspective of historical development.

310. *Advanced Microeconomic Theory 1*. 4 hr. PR: ECON 211 or 220 and graduate standing or consent. Theories of production and allocation, utility; theory of the firm, pricing in perfect and imperfect markets and operations.

311. *Advanced Micro Theory 2*. 4 hr. PR: ECON 310. General equilibrium analysis, distribution theory, welfare economics.

312. *Advanced Macro Theory 1*. 3 hr. PR: ECON 212 and 220 and graduate standing or consent. Classical, Keynesian, and Post-Keynesian theories.

313. *Advanced Macro Theory 2*. 3 hr. PR: ECON 312. Models of economic growth and fluctuations, and other advanced topics in macroeconomic theory.

316. *History of Economic Doctrines and Analysis*. 3 hr. PR: ECON 310 and graduate standing or consent. Writings of the major figures in the development of economic doctrines and analysis.

Quantitative Economics

220. *Introduction to Mathematical Economics*. 3 hr. PR: MATH 15 or 128, and ECON 54 and 55; or consent. Principal mathematical techniques including set operation, matrix algebra, differential and integral calculus employed in economic analysis. Particular attention given to static (or equilibrium) analysis, comparative-static analysis and optimization problems in economics.

225. *Applied Business and Economic Statistics*. 3 hr. PR: ECON 125 or STAT 101 or consent. Continuation of ECON 125. Principal statistical methods used in applied business and economic research including multiple regression, index numbers, time series analysis, forecasting models and methods, and sampling design.

226. *Introductory Econometrics*. 3 hr. PR: ECON 125 or consent. Statistical methods applied to the analysis of economic models and data. Emphasis placed on multiple regression, multicollinearity, seasonality, heteroscedasticity, autocorrelation, dummy variables, time series analysis, distributed lags and simultaneous equations with economics and computer applications.

320. *Mathematical Economics*. 3 hr. PR: ECON 220 or consent. Linear programming, input-output analysis, complex numbers, linear difference and differential equations, comparative-static and dynamic analysis and optimization techniques.

325. *Econometrics 1*. 3 hr. PR: STAT 262 or consent. Specification, estimation, and verification of single-equation models. Topics covered include multicollinearity, autocorrelation, heteroscedasticity, dummy variables, time series analysis and forecasting, functional form, and specification error analysis. Students should be familiar with matrix algebra.

326. *Econometrics 2*. 3 hr. PR: ECON 325 or consent. Identification and estimation of simultaneous equation models and their use in forecasting and simulation. Other advanced topics include distributed lags, autoregressive models, errors in variables models, aggregation problems, and pooled cross-section/time-series models.

328. *Advanced Mathematical Economics*. 3 hr. PR: Consent. Mathematical properties of microeconomic models of general equilibrium and welfare, existence, uniqueness, and stability of equilibrium. Applications of Hamiltonian and maximum principles to growth models and economic control problems. Investigation of separability theorems.

329. *Seminar in Econometrics*. 3 hr.

Monetary Economics

330. *Monetary Economics*. 3 hr. PR: ECON 312 or consent. Sources and determinants of supply of money; demand for money for transactions and speculative purposes; general equilibrium theory of money, interest, prices, and output; role of money in policy.

334. *Seminar in Monetary Economics*. 3 hr. PR: ECON 312 or consent.

Public Finance

241. *Public Finance*. 3 hr. PR: ECON 51 or 55. Governmental fiscal organizations and policy; taxes and tax systems with particular emphasis on federal government and state of West Virginia.

340. *Theory of Public Finance*. 3 hr. PR: ECON 310 and graduate standing or consent. Economic role of government in a mixed economy with regard to resource allocation between public and private sectors, influence of government upon income distribution and economic stability and growth.

344. *Seminar in Public Finance*. 3 hr.

Public Regulation and Control

245. *Government and Business*. 3 hr. PR: ECON 51 or 55. Market structure, conduct and performance; analysis of the antitrust laws—judicial interpretation and effect on the business sector.

246. *Transportation Economics*. 3 hr. PR: ECON 51 or 55. Economic and institutional analysis of the domestic transportation system of the United States. Topics include role of transportation, carrier characteristics and services, transportation rates and costs, regulation of transportation.

345. *Industrial Organization*. 3 hr. PR: ECON 310 and graduate standing or consent. Economic analysis of market structure, conduct, and performance; in-depth evaluation of markets and industries in the United States and the effect of government intervention on firm behavior.

349. *Public Regulation of Business*. I or II. 3 hr. Economic analysis of regulation of specific industries such as public utilities.

International Economics

250. *International Economics*. 3 hr. PR: ECON 51 or 55. Development of trade among nations; theories of trade, policies, physical factors, trends, and barriers in international economics.

350. *Advanced International Economics*. 3 hr. PR: ECON 211 and 212. Contemporary theories of international economics; analysis of current problems in world trade and finance.

354. *Seminar in International Economics*. 3 hr. PR: ECON 212.

Regional Economics

255. *Regional Economics*. 3 hr. PR: ECON 51 or 55. Analysis of the regional economy's spatial dimension, emphasizing interregional capital and labor mobility, the role of cities, objectives and issues of regional policy, lagging regions and Appalachia, growth poles, and regional growth and income distribution.

257. *Urban Economics*. 3 hr. PR: ECON 51 or 55. Analyzes the spatial dimensions of the urban economy, emphasizing both urban economic theory and urban policy. Issues include cities and income inequality, urban upgrading function, blight, economics of ghettos, the economics of urban size.

355. *Advanced Regional Economics*. 3 hr. PR: ECON 310 and graduate standing or consent. Regional income and flow of funds estimation, regional cyclical behavior and multiplier analysis, industrial location and analysis, techniques of regional input-output measurement, impact of local government reorganization on regional public service and economic development.

357. *Advanced Urban Economics*. 3 hr. PR: ECON 310 and graduate standing or consent. Analyzes the spatial dimensions of the urban economy, emphasizing urban theory, policy, and empirical research. Major subjects include urban income distribution, residential location theory, spatial structure, neighborhood change, blight, ghettos, segregation, renewal, and city size.

358. *Spatial Economics*. 3 hr. PR: ECON 310 or consent. Spatial dimension incorporated into the study of economic activity; spatial competition, market area analysis, locational equilibrium analysis, general spatial equilibrium.

359. *Seminar in Regional Economics*. 3 hr.

Labor Economics

360. *Advanced Human Resource Economics*. 3 hr. PR: ECON 310 and graduate standing or consent. Examination and analysis of our social and economic efforts to solve current manpower problems in the U.S., including structural unemployment and inflation.

364. *Seminar in Labor Economics*. 3 hr. PR: ECON 310 and graduate standing or consent.

Economic History

270. *Growth of the American Economy*. 3 hr. PR: ECON 51 or 55. Central issues in development of the American economy.

370. *Economic History*. 3 hr. Examination of the methods of research and issues in economic history of the United States.

374. *Seminar in Economic History*. 3 hr.

Economic Development

213. *Economic Development*. 3 hr. PR: ECON 54 and 55. The problems, changes, and principal policy issues faced by nonindustrialized countries.

Energy and Environmental Economics

380. *Energy Economics*. 3 hr. PR: Graduate standing and consent. Welfare analysis of supply interruptions and the foreign dependence question. Study of various energy resources in reference to policy alternatives under variant growth conditions and input-output models. Examination of coal industry and coal externalities.

384. *Environmental Economics*. 3 hr. PR: ECON 310 and ECON 380 or MER 345 and graduate standing or consent. Examination of the theoretical and empirical literature dealing with externalities (pollution), the relationships between pollution and social costs, the relationships between energy production and environmental quality, and the optimal strategies for pollution abatement.

Other Economics Courses

299. *Independent Readings in Economics*. 3-6 hr. Supervised readings for undergraduate and graduate students in special areas.

390. *Independent Reading in Economics*. 3-6 hr. Supervised readings. For graduate students in special areas.

409. *Research Design and Methodology*. I, II. 1-3 hr. PR: Completion of the comprehensive theory exams or consent. Basic research approaches based on examples from the student's own work, papers presented at the departmental research seminar series, and economics literature in general.

491. *Seminar in Applied Economic Analysis*. 3 hr. PR: 12 hr. of graduate-level economics.

497. *Research*. 1-15 hr.

Industrial Relations

Dietrich Schaupp, Coordinator, Industrial Relations

116 Business and Economics Building

Degrees Offered:

Master of Science

Industrial Relations Area of Emphasis available for

Doctor of Philosophy

The Department of Management and Industrial Relations offers a master of science in industrial relations. The AACSB accredited program of study prepares students for professional positions in human resources (employee relations) and labor relations. Course work can be structured to prepare students for doctoral studies in industrial relations, economics, management, or law.

Doctor of Philosophy Studies

The department operates, in conjunction with the Department of Economics, an industrial relations Doctor of Philosophy option. Master's students who plan to pursue the industrial relations option in the Ph.D. program in economics should align their master's work with the degree requirements.

Entry-level professional opportunities for IR graduates include such positions as employee relations associate, assistant personnel manager, human resources administrator, labor relations representative, professional research analyst, compensation analyst and benefits administrator. Other positions include staff representative with organized labor, apprentice arbitrator, labor-management consultant, National Labor Relations Board field examiner, government employee relations representative, and employment analyst. Many graduates are employed by Fortune 500 companies. Some find positions with organized labor, all levels of government, and advocacy organizations. The department, in conjunction with the WVU Career Services Center, makes a concerted effort to place graduates in positions that fulfill student job objectives.

Curriculum

The curriculum is a blend of theory, analysis, and pragmatism. Core course work serves two purposes: to provide in-depth knowledge and skills pertaining to the human resource and labor relations functions of organizations, and to acquaint students with the operation of the other organizational business functions. A substantial number of elective courses allows the student to tailor the curriculum to meet particular career goals and interests. More than 50 faculty members in a dozen departments offer course work and/or conduct research in the human resources and IR areas.

IRSA

Students are encouraged to participate in academic-related extracurricular activities. Many are cosponsored by the Industrial Relations Student Association: the *ILR Newsletter*, resume mailings, social events, and honors banquets. Outstanding academic achievement is recognized by membership in the Industrial Relations Honor Society. The faculty makes Outstanding IR Student awards yearly to persons selected on the basis of scholarship, informal leadership and extracurricular activities.

Financial Aid

A limited number of graduate assistantships and tuition waivers are available on a competitive basis. Major selection criteria include the applicant's grade-point average in prior academic work and GMAT/GRE scores. Graduate assistants are paid a cash stipend during the regular semesters that is competitive in amount with that offered by other universities; they are assigned to faculty members to assist in research, teaching and other academic endeavors. Additional scholarships are available on a competitive basis to minority students. Additional information and application forms can be obtained from the Director of Graduate Programs.

GOALS

Graduate Opportunities for Advanced Level Study (GOALS) is the minority recruiting program of a national consortium of IR schools. Minority students admitted to WVU's IR program are eligible to compete for full fellowships offered by GOALS.

Academic Common Market

The master of science program in industrial relations is an Academic Common Market program. Residents of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, South Carolina, Tennessee, Texas, or Virginia who are admitted to the M.S. IR program can pay tuition at West Virginia University's in-state (resident) rates.

Admission

The master of science in industrial relations is interdisciplinary in nature and no specific undergraduate major is required. Course work in computer science, labor economics, statistics, and business disciplines is helpful. To gain admission into the master of science in industrial relations program, an applicant must have a bachelor's degree from an accredited institution. Overall grade point average is considered with additional attention given to the grade point average achieved in the last sixty hours of course work. Either the Graduate Management Admissions Test (GMAT) or the Graduate Record Examination (GRE) is required. A resume is a requirement of the application process. No action is taken on an application for admission until a GMAT or GRE score is submitted. International students must also submit a satisfactory TOEFL score.

Although not required, applicants may wish to send additional supportive material, including letters in support of their application, reference letters, a resume of work experience, and an example of written work.

Application Deadlines

Students may enter the graduate program in any semester/session. Application deadlines are one month before the start of classes in the term for which admission is sought. Later applications, while acceptable, may diminish the chances for admission due to the graduate class being filled. Since no admission decision can be made without the applicant's GMAT/GRE score being submitted, applicants should keep in mind the GMAT/GRE test schedule.

Institute of Industrial and Labor Relations

The mission of the Institute of Industrial and Labor Relations (ILR) is to coordinate instruction, research, and public service activities, which embrace a study of the elements of human resources development uniquely identified with the economy of West Virginia. Membership is open to faculty who have an interest in the mission of the ILR. The ILR serves as a means of rational response to economic trends based on an amalgamation of the three University functions: faculty/student research on a continuing basis in search of human resource development possibilities; use of research results in credit instruction to produce a growing cadre of graduates aware of and trained to be able to contribute to the state's economic goals; and, using both of the former, extension and public service efforts designed to place the state's human resource development and use activities on their most economically rational courses.

Program

The master of science in industrial relations has a two-part core. The total length of the program will not be greater than 47 semester hours nor less than 42 hours. Program length depends upon the composition of course work taken as an undergraduate.

The required IR core classes are designed to provide a solid, multidisciplinary foundation of IR theory and practice. IR 314 presents an overview of IR theory, practice, and issues from a management perspective. Its counterpart is IR 316, which covers the same subjects from the perspective of organized labor. In ILR 312 the concepts of industrial psychology are applied to IR. An eclectic view of collective bargaining and labor relations complete the sequence (ILR 262).

The 12 hours of required IR core are:

ILR 262 *Collective Bargaining and Labor Relations* 3 hr.

ILR 312 *Organizational Theory, Behavior and Communication* . 3 hr.

ILR 314 *Industrial Relations Strategy and Policy* 3 hr.

ILR 316 *Labor Organization Industrial Relations* 3 hr.

Specific course offerings and requirements may have changed since this document was printed. Please contact the director of graduate programs for the current program description.

B&E Core

Industrial relations functions are not separate from other organizational activities. Firms, labor organizations, and government units integrate IR with their management, business law, economics, accounting, finance, and marketing activities. The Business and Economics (B & E) core is designed to provide IR students with the body of knowledge necessary to these functions. They also include skills classes in computer hardware and software, management information systems, and integrative policy formulation. Students who have acquired equivalent knowledge of these areas as undergraduates may waive up to five hours of this functional core. If equivalent undergraduate course work exceeds five hours, IR elective course work will be substituted for B & E core hours.

Program length may vary between 42 and 47 semester hours. Students who have no B & E background will complete a 47 credit-hour program. Those with equivalent course work may waive up to five hours of graduate requirements, resulting in a 42 credit-hour program.

The B & E core is as follows:

ACCT 311 *Financial Accounting for Decision Making* 3 hr.

BLAW 311 *Legal and Regulatory Environment* 2 hr.

ECON 317 *Economic Decision Making* 2 hr.

FIN 311 *Managerial Finance* 2 hr.

MANG 311 *Management Information Systems* 3 hr.

MANG 321 <i>Operations Management/</i> <i>Applied Quantitative Analysis</i>	3 hr.
MANG 351 <i>Policy and Strategy</i>	3 hr.
MKTG 311 <i>Marketing Management</i>	2 hr.

The remaining hours will be chosen from the following courses after consultation with the advisor. While the listed courses are preferred, considerable latitude may be given the student by the advisor to choose other courses from public administration, law, industrial engineering, or other fields that are particularly appropriate to the student's background and interest. Approval must be obtained in advance. No more than six elective hours may be taken at the 200 level. Electives may be chosen from the following:

Industrial Labor Relations

301 <i>Industrial Relations Analytical Techniques 1</i>	3 hr.
302 <i>Industrial Relations Analytical Techniques 2</i>	3 hr.
310 <i>Human Resource Economics</i>	3 hr.
330 <i>Compensation Issues</i>	3 hr.
332 <i>American Trade Unionism</i>	3 hr.
333 <i>Seminar: Quality of Work Life</i>	3 hr.
334 <i>Work Group Dynamics and Leadership</i>	3 hr.
337 <i>Practicum in Industrial Interviewing</i>	3 hr.
340 <i>Arbitration Theory and Practice</i>	3 hr.
342 <i>Advanced Collective Bargaining</i>	3 hr.
344 <i>Benefits</i>	3 hr.
345 <i>Equal Employment Opportunity Problems</i>	3 hr.
491A <i>Advanced Study</i>	1-6 hr.
491B <i>Advanced Study: Practicum in ILR</i>	3 hr.

Management

217 <i>Personnel and Compensation</i>	3 hr.
218 <i>Focal Points in Management</i>	1-3 hr.
325 <i>Organizational Design</i>	3 hr.
349 <i>Seminar in Management</i>	3 hr.

Business Law

211 <i>Personnel Relations and the Law</i>	3 hr.
311 <i>Legal and Regulatory Environment</i>	3 hr.

Economics

211 <i>Micro Economic Analysis</i>	3 hr.
212 <i>Macro Economic Analysis</i>	3 hr.
310 <i>Advanced Micro Theory 1</i>	4 hr.
312 <i>Advanced Macro Theory 1</i>	3 hr.
318 <i>Economic Policy</i>	2 hr.
340 <i>Public Finance</i>	3 hr.
360 <i>Advanced Human Resource Economics</i>	3 hr.
364 <i>Seminar in Labor Economics</i>	3 hr.

GPA

The industrial relations program requires that the student maintain a grade-point average of at least 3.0 on all work taken as a graduate student while enrolled in the College of Business and Economics. In addition, the student must maintain a 3.0 average in all work counting toward the graduate degree. A student whose cumulative grade-point average falls below 2.75 will be placed on probation. If the student's average is not brought up to 2.75 by the end of the following semester, the student will be suspended from the program. A grade below C in more than one course taken while enrolled as a graduate student will result in suspension from the program.

Industrial Relations Emphasis in the Economics Ph.D. Program

Graduate work in industrial relations typically is interdisciplinary in nature. The Ph.D. emphasis retains this orientation while providing students with a Ph.D. level of understanding of economic theory and economic analysis. Students in the industrial relations option take the nine core courses in the Ph.D. in economics program, take comprehensive examinations in microeconomic theory and macroeconomic theory, and follow the rules and requirements for obtaining the economics Ph.D.

Industrial and Labor Relations (ILR)

262. *Collective Bargaining and Labor Relations*. 3 hr. PR: ECON 160 or consent. Examination of the theory and practice of collective bargaining. Topics include economics and historical environment, labor law, unionization, contract negotiation, patterns in contract content, conflict resolution, grievance handling, and an introduction to arbitration.

301. *Industrial Relations Analytical Techniques 1*. 3 hr. PR: Admission to the ILR graduate program and C S 5 or equiv. Introduction to the software and hardware appropriate for use in human resource applications, emphasizing efficient and effective use of previously developed software. Introduction to quantitative analytical decision-making techniques.

302. *Industrial Relations Analytical Techniques 2*. 3 hr. PR: Admission to the ILR graduate program. Further development of the quantitative analytical techniques and of business information systems used in the human resources field. Emphasis on quantitative decision-making and information systems in an industrial relations setting.

310. *Human Resources Economics*. 3 hr. PR: Admission to the ILR graduate program. Consideration of the conditions of employment and unemployment at both macro and micro levels under varying degrees of competition, including the process of labor force preparation, labor market data and policy.

312. *Organizational Theory, Behavior, and Communication*. 3 hr. PR: Consent. Emphasis on the communication processes involved in problem resolution including organizational decision making. Problems include organizational evaluation methods, training and leadership development, staffing, evaluation of proficiency of individuals, systems, and procedures.

314. *Industrial Relations Strategy and Policy*. 3 hr. PR: Consent. Explores the integrative dimensions of organizational policies and their relationship to the personnel and industrial relations function. Business ethics in the industrial relations function.

316. *Labor Organization Industrial Relations*. 3 hr. PR: Consent. Introduction to dynamics (adversary/cooperative) of industrial relations from a union viewpoint. Topics include conflict resolution, union government, alternatives to economic conflict bargaining, interaction, the state of industrial relations and work society.

330. *Compensation Issues*. 3 hr. PR: Consent. Seminar in compensation designed to develop further understanding of compensation theory and practice. Topic areas will include labor supply, wage theory, legal constraints, motivation, equity theory, organizational development as well as compensation structure and administration.

332. *American Trade Unionism*. 3 hr. PR: ILR 262 or 316 or consent. Examines the rise of American unionism and traces historical factors shaping its philosophy. Topics include

economic conditions and union history, comparisons of AFL and CIO structures and the AFL-CIO as a government.

333. *Seminar: Quality of Work Life*. 3 hr. PR: Consent. Analysis of current trends and approaches in "quality of work life improvement" with special attention to developments in participative management, job enrichment and gain sharing. Results of current research are featured.

334. *Work Group Dynamics and Leadership*. 3 hr. PR: Consent. Small group or individual research on topics related to leadership and group dynamics in the work environment including training and other human relations programs.

337. *Practicum in Industrial Interviewing*. 3 hr. PR: ILR 312 and consent. Experiential learning of industrial interviewing techniques covering legal and technical aspects of employment interviewing and other types of interviewing.

340. *Arbitration Theory and Practice*. 3 hr. PR: ILR 262 and consent. Study of the purpose of arbitration, trends, principles of contract construction, hearing procedure evidence, remedies, training and education of arbitrators, training of advocates, and decision writing. Students will arbitrate mock cases.

342. *Advanced Collective Bargaining*. 3 hr. PR: ILR 262 or consent. Development of the economic theory, empirical analysis and policy implications of the impact of collective bargaining on wages, employment, market structure, and prices.

344. *Benefits*. 3 hr. Considers employee benefits from the perspective of the industrial relations specialist who is responsible for articulating and administering a corporate program. Includes study of all benefits covered by major federal legislation.

345. *Equal Employment Opportunity Problems*. 3 hr. PR: Consent. A series of lectures by specialists in equal employment opportunity affairs. Lecturers will include attorneys, directors of state and national EEO agencies, and representatives of business and industry and the labor movement.

491. *Advanced Study*. 1-6 hr.

497. *Research*. 1-15 hr.

CORE Courses

Accounting (ACCT)

311. *Financial Accounting for Decision Making*. 3 hr. PR: Consent. Basic accounting assumptions and standards underlying financial statements, the significance of financial statement measurements, and the relevance of such data for planning and control. Emphasis on financial statement and cash-flow analysis.

Business Law (BLAW)

311. *Legal and Regulatory Environment*. 2 hr. PR: Consent. Examination of the legal environment in which business decisions are made and the response of the legal environment to change. Familiarization with the role of administrative agencies in the regulatory process.

Economics (ECON)

317. *Economic Decision Making*. 2 hr. PR: ECON 54 or consent. Analysis of the firm as an optimizing unit operating in the market place. Examination of product demand, production and costs, pricing theory and practices, risk, and capital budgeting.

Finance (FIN)

311. *Fundamentals of Finance*. 2 hr. PR or Coreq: ACCT 311 or consent. Covers the basics of standard financial activities of the firm including: financial planning, the structure of financing, and asset selection.

Management (MANG)

301. *Organization Behavior and Ethics*. 3 hr. PR: Consent. Interpersonal relationships through which administration becomes effective. Emphasis on human factors, but influences of economic and technological factors also are considered. Focus on ethics and importance of harmony between individual needs and organization goals.

311. *Management Information Systems*. 3 hr. PR: Consent. Examines computer technology, applications, information systems, and performance. Computer system planning, selection, and implementation. Computer impact upon management, organization, and society from a managerial point of view.

321. *Operations Management/Applied Quantitative Analysis*. 3 hr. PR: Consent. Review of concepts, techniques, and models encountered in manufacturing and service operations. Modeling approach and computer applications in operations management and management science are emphasized.

351. *Policy and Strategy*. 3 hr. PR: Consent. M.B.A. capstone course. Integrates functional knowledge with strategy formulation and strategy implementation concepts. Cases of organizations varying in size, national affiliation, and profit orientation are analyzed with special emphasis on ethics and social responsibility.

Marketing (MKTG)

311. *Marketing Management*. 2 hr. Introduction to marketing management with specific emphasis on consumer behavior and market segmentation, product planning, promotion, distribution, and pricing.

College of Creative Arts

Philip J. Faini, M.M., Dean and Director

J. Bernard Schultz, Ph.D., Associate Dean for Academic Affairs

The College of Creative Arts, composed of the Divisions of Art, Music, and Theatre, serves an academic and cultural function and provides an educational and interdisciplinary environment for the exploration, advancement, and understanding of the visual and performing arts. The College boasts a distinguished faculty of actors, artists, composers, conductors, directors, instrumentalists, vocalists, and writers bring to the college a commitment to a creative process of artistic growth which is shared with each student. Through teaching, research, and service, the faculty of the college provides students the professional preparation to achieve the highest level of performance, scholarly research, and creative activity.

Graduate programs in art, music, and theatre are characterized by quality and diversity of faculty, students, and curricular opportunity. Each division is an accredited member of the nationally recognized accrediting agency for professional instruction in the discipline: art programs by the National Association of Schools of Art and Design; music programs by the National Association of Schools of Music; and theatre programs by the National Association of Schools of Theatre.

The College of Creative Arts is committed to providing the highest levels of creative, intellectual, and cultural experiences in art, music, and theatre to the University, the state, and the region. In an environment rich with art exhibitions, concerts, and plays, students gain the knowledge, skills, experience, and inspiration necessary for professional success. Students, faculty, and visiting artists present a full calendar of performances and exhibitions open to the public.

The Creative Arts Center, which houses the college, is a modern, multimillion-dollar instructional and performance facility with three theatres, two recital halls/recording studios; scenery, painting, drawing, design, costume, printmaking, sculpture, ceramic, and instrumental studios; additional art studios; and two art galleries.

The Ph.D. curriculum in music prepares students for careers as teachers in higher education; the D.M.A. curricula in performance and literature (piano, organ, percussion, voice) or composition prepare students who aspire for teaching careers in higher education. The master of fine arts (M.F.A.) is a terminal degree in art and theatre that prepares students for careers in ceramics, graphic design, painting, printmaking, sculpture, acting, or theatre design/technology.

The master of music degree enhances undergraduate programs in performance, music education, theory, music history, and composition. The master of arts has concentrations in art education, art history, and studio art.

For further information, please contact:

Graduate advisor, Division of Art at (304) 293-2140 X 141

Director of graduate studies in music, Division of Music at (304) 293-5511 X 196

Chair, Division of Theatre at (304) 293-2020 X 120

Our mailing address is College of Creative Arts, Creative Arts Center, West Virginia University, P.O. Box 6111 Morgantown, WV 26506-6111.

Special Admission Information

The College of Creative Arts offers graduate programs leading to terminal degrees in art, music, and theatre. Prospective students apply for admission through the University's Office of Admissions and Records. All candidates for graduate degrees must conform to University regulations for graduate study. Requirements for admission to specific programs are included in the program descriptions. Most programs require an audition or a portfolio review as a part of the admission process.

Full graduate assistants receive a stipend and remission of tuition. Approximately 11 graduate assistantships in art, 28 in music, and 14 in theatre are available each year. Application for these assistantships should be made to each division; the application deadline for art is March 1 and October 15, for music March 1, and for theatre April 1.

Graduate Programs

Art	M.A.
Music	M.M. D.M.A., Ph.D.
Theatre	M.F.A.
Visual Art	M.F.A.

Graduate Faculty

† Indicates regular membership in the graduate faculty.

* Indicates associate membership in the graduate faculty.

Art

Professors

†Robert P. Anderson, M.F.A. (Alfred U.). Ceramics.

*Carmon Colangelo, M.F.A. (LSU). Chairperson. Printmaking.

*Eve Faulkes, M.F.A. (R.I. School of Design). Graphic design.

†Clifford A. Harvey, B.F.A. (Mpls. C. Art & Des.). Graphic design.

†Margaret T. Rajam, Ph.D. (U. Mich.). *Emerita*.

†Bernard Schultz, Ph.D. (U. Pitt.). Associate Dean, College of Creative Arts. Art history, Italian renaissance, Modern art, Art theory.

Associate Professors

*Victoria Fergus, Ph.D. (Purdue U.). Undergraduate advisor. Art education.

*Alison Helm, M.F.A. (Syracuse U.). Sculpture.

*Paul Krainak, M.F.A. (North. Illinois U.). Painting. Graduate advisor.

*Sergio Soave, M.F.A. (WVU). Printmaking. 2-D visual foundations.

†William J. Thomas, Ph.D. (Penn. St. U.). Art education.

Assistant Professors

Christopher Hocking, M.F.A. (LSU). Drawing, Painting, Printmaking.

Marian Hollinger, M.A. (U. of Toronto). Art history, Medieval art, Women in art, Writing in art.

Cara Jaye, M.F.A. (U. Co.-Boulder). Painting, Drawing, Visual foundations, Photography.

Iain Machell, M.F.A. (SUNY-Albany). Visual foundations, Sculpture.

Adjunct Assistant Professor

Kristina Olson, M.A. (SUNY-Stony Brook). Art Criticism and Contemporary Art. Curator.

Music

Professors

†Peter Amstutz, D.M.A. (Peabody Conserv.). Piano.

†John Beall, Ph.D. (U. Roch, Eastman Sch. of Mus.). Composition, Theory.

†Philip J. Faini, Ph.D. (WVU). Dean and Director, College of Creative Arts. Percussion, African music.

†William P. Haller, D.M.A. (N. Tex. St. U.). F.A.G.O. Organ, Theory.

†Barton Hudson, Ph.D. (Ind. U.). Director of Graduate Studies. Musicology, Renaissance music.

†Christine B. Kefferstan,* D.M.A. (U. Cinn.). Coordinator, Keyboard instruments, Piano.

†Gerald Lefkoff, Ph.D. (Cath. U. Am.). Coordinator, Theory-Composition. Theory, Electronic music, Viola.

†James E. Miltenberger, D.M.A. (U. Roch.-Eastman Sch. of Mus.). Piano, Piano repertoire.

†Augusto Paglialunga, M.M. (New England Conserv.). Voice.

†William Skidmore, M.M. (U. Illinois). Coordinator, Stringed Instruments, Cello.

†Gilbert Trythall, D.M.A. (Cornell U.). Composition, Electronic music, Theory.

*John F. Weigand, D.M.A. (Florida State). Coordinator, Undergraduate Admissions. Clarinet, Chamber music.

- *Don G. Wilcox, M.A. (Cal. St. C.-L. Bch.). Director of Bands. Coordinator, conducting.
- *Cecil B. Wilson, Ph.D. (Case West. Res. U.). Assistant Vice President for Faculty Development
Musicology, 19th century music, Orchestration.

Associate Professors

- *David Bess, Ph.D. (WVU). Instrumental music education.
- *Joyce Catalfano, M.M. (Ithaca C.). Coordinator, Woodwind instruments. Flute.
- *Barbara Coeyman, Ph.D. (CUNY). Musicology, Baroque music, Collegium Musicum.
- *John E. Crotty, Ph.D. (Eastman Sch. of Mus.). Theory, Analysis, Composition.
- *Cynthia Dewey, D.M.A. (Louisiana St. U.). Coordinator, Voice/Opera. Voice, Vocal diction and pedagogy.
- *Terry B. Ewell, Ph.D. (U. Wash.). Interim Chairperson. Bassoon, Theory.
- *Janis-Rozena Peri, M.M. (Miami U.). Voice.
- *Janet Robbins, Ph.D. (Ohio St. U.). General music education.
- *Connie Sturm, Ph.D. (U. Okla.). Piano, Group piano, Piano pedagogy.
- *Robert H. Thieme, Jr., M.M. (WVU). Director, WVU Opera Theatre. Opera, Vocal repertoire, Accompanying, Coaching.
- *Christopher Wilkinson, Ph.D. (Rutgers U.). Coordinator, Music History-Literature. Musicology, 20th century music.
- *John R. Winkler, D.M.A. (Northwestern U.). Coordinator, Brass and percussion instruments. Trumpet, Theory, Chamber music.

Assistant Professors

- *Virginia Thompson, D.M.A. (U. of Iowa). French Horn.

Theatre

Professors

- *Frank Gagliano, M.F.A. (Columbia U.). Claude Worthington Benedum Professor. Playwriting.
- *Joann Spencer Siegrist, M.F.A. (U. Ga.). Puppetry, Creative drama.
- *John C. Whitty, Ph.D. (U. Iowa). Theatre history.
- *Mary Katherine Wiedebusch, M.A. (WVU). Dance.

Associate Professors

- *W. James Brown, M.F.A. (U. Wash.). Theatre design.
- *Michelle Guillot, M.F.A. (Yale Sch. Drama). Theatre design.
- *Gerry McGonigle, M.F.A. (American Conservatory Theatre). Acting.
- *Victor G. McQuiston, M.F.A. (Ohio St. U.). Technical direction.
- *Linda D. Milian, M.F.A. (Rutgers U.). Costuming.
- *Joseph Oliveri, M.F.A. (American Conservatory Theatre). Acting.
- *William J. Winsor, M.F.A. (Ohio St. U.). Interim Chairperson, Scenic design.

Assistant Professors

- *Amelia Howe Kritzer, Ph.D. (U. Wisc.-Madison). Theatre history.

Art

Paul Krainak, Graduate Advisor, Division of Art

419-A Creative Arts Center

Degrees Offered: Master of Arts, Master of Fine Arts

The graduate programs in art lead to a master of arts with emphasis in art, art education, or art history (one to two years or 30 credit hours) and to a master of fine arts with emphasis in visual art (two to three years or 60 hours). Both of these programs are highly selective and closely integrated parts of the professional education in art offered by the Division of Art. All applicants are expected to have artistic maturity and the motivation to achieve excellence in their areas of concentration.

Accreditation

The Division of Art is an accredited institutional member of the National Association of Schools of Art and Design, the only nationally recognized accrediting agency for

professional art instruction. Applicants to programs in art must comply with the standards for admission set by West Virginia University, the College of Creative Arts, and the Division of Art.

Master of Fine Arts

The master of fine arts is the terminal degree in studio art; it prepares students for professional practice in art. Our selective and limited enrollment insure regular individual contact with a dedicated, diverse faculty, who are committed to a sustained professional exchange with each student. A collaboratively designed curriculum includes weekly critiques engaging all studio majors and faculty. Media experimentation is encouraged. Students must be able to apply and communicate a diverse body of knowledge relating historical, cultural, contemporary, and aesthetic issues to their professional practice. Students are expected to articulate and defend their position in the profession of art.

Master of Arts

Master of Arts students in studio art, art education, or art history critically study, explore, and evaluate their chosen content area, ensuring a solid foundation for further professional practice or research.

Reviews

All students enter the graduate programs in art as preliminary candidates. Students in the M.F.A. program are reviewed for advancement at the end of their first year of study or upon the completion of 24-30 credit hours. Students in the M.A. program are reviewed at the end of their first semester of study or upon the completion of 12-15 credit hours. A satisfactory review allows students to have degree candidate status. Candidacy status must be approved by the student's graduate committee. All students in degree programs, either M.F.A. or M.A., must prepare a written thesis. A graduate exhibition is required of all M.F.A. students.

Deficiencies

Before students are admitted, they must meet any deficiencies in their undergraduate preparation. Credits taken to erase deficiencies do not count toward a graduate degree.

The Division of Art has high expectations for its graduate students. Because of this, certain standards of achievement exceed the minimum standards set by the University for all graduate students. The Division of Art reserves the right to impose stricter limitations on all art graduate students. **Credit hours in courses with an earned grade of "C" do not automatically count toward graduate degree requirements.** The graduate committee and the divisional chairperson have the right to declare such credit hours unacceptable.

Supplies

All graduate art majors are required to purchase most of their personal equipment and expendable supplies. Some studio areas purchase bulk supplies for student use in their courses from an art fee which ranges from \$105 to \$140 per semester.

Thesis

All candidates for a graduate degree in art must prepare a written thesis (or graduate project) related to their work and activity as a graduate student. The chairperson of the student's graduate committee supervises the preparation of the thesis, which must be completed at least one month before the anticipated graduation date. The thesis must be prepared according to the form prescribed in the WVU regulations governing the preparation

of dissertations and theses as well as divisional guidelines, unless an exception is authorized in advance by the student's graduate committee and the division chairperson.

Program Transfer

A preliminary candidate in a graduate art program is not guaranteed acceptance into another graduate art program. A change from the M.F.A. program to the M.A. program (or the reverse) must be approved by the graduate faculty of the Division of Art. Under normal conditions, such a change is not considered until the student has established credibility by successfully completing 12-15 approved credit hours of study at WVU. A change to a program outside the Division of Art must be approved by the receiving unit. To make an application for a double degree program or special interdepartmental programs at the graduate level, students must have written prior approval of the division chairperson.

Admission Requests for application forms for admission to graduate degree programs in art must be addressed to the Office of Admissions and Records, West Virginia University, P.O. Box 6009, Morgantown, WV 26506-6009. Applicants must specify the degree and subject area of their choice and return the application and transcripts from each college or university previously attended to the above address with a \$25 nonrefundable processing fee.

Portfolio All applicants for both the M.F.A. and the M.A. (studio and art education) must present a portfolio for admission to the Division of Art. Applicants for art history must submit a copy of a written research project. Applicants should take care to select slides of recent and representative work for inclusion in the portfolio. The portfolio must contain a statement of purpose, and three letters of recommendation from college faculty or persons knowledgeable of the applicant's interests and abilities, and twenty 35mm slides. Each slide should be labeled with name, date of completion, size of work, and type of medium and arranged in an 8" by 11" transparent plastic slide holder for mailing. The complete portfolio, with the purpose statement, three letters, and 20 slides, should be submitted to: Graduate Advisor, Division of Art, College of Creative Arts, West Virginia University, P.O. Box 6111, Morgantown, WV 26506-6111 Provide a stamped, self-addressed envelope to assure prompt, safe return of the slides.

Master of Fine Arts in Visual Arts

The Master of Fine Arts, a professionally-oriented terminal degree in the studio arts, requires a baccalaureate degree in art or its equivalent for admission. Preparation should include 12 hours of art history, 70 hours of studio art related to professional needs, and 36 hours of general education. The suggested distribution of studies for the 60 credit hour program is:

Art Studio Major Area	36 hr.
Art Studio Elective	6 hr.
Teaching practicum/Professional practice	3 hr.
Graduate Seminar (or approved elective)	3 hr.
Art History	6 hr.
Graduate Exhibition and Thesis	6 hr.

To earn the M.F.A., a student must complete a combined (undergraduate and graduate) total of 118 hours in studio, 18 hours in art history, and the appropriate number of credit hours in general education courses.

All students in the M.F.A. program are required to submit a statement of intention after completion of 12 credit hours, to indicate the direction and implementation of their studio involvement.

Transfers In addition to the application materials listed, transfer students must ask to transfer graduate work completed elsewhere. Transcripts must accompany the written request. Transfer credit is not automatic. The art faculty review committee, the graduate advisor, and the division chairperson will determine how much, if any, previous graduate-level work may be transferred. At least 60 percent of the work for the M.F.A. must be completed at WVU in the studio arts.

Residence Requirements The M.F.A. student must complete the stated requirements in order to graduate, usually in a two-year period. Most students take 15 hours per semester. All students accepted into the M.F.A. program are required to spend four full-time semesters (excluding summer sessions) in residence. Concentrations for the M.F.A. include ceramics, graphic design, painting, printmaking, and sculpture.

Course Distribution

The following is the recommended distribution of required M.F.A. courses:

First Year—Preliminary Candidate

Art Studio Major Area	18 hr.
Art Studio Elective	3 hr.
Teaching Practicum	3 hr.
Graduate Seminar	3 hr.
Art History*	3 hr.
Total	30 hr.

*Graduate credits in art history must be at the 300-level (graduate) and are in addition to courses taken or required at the undergraduate level.

Second Year—M.F.A. Candidate

Art Studio Major Area	18 hr.
Art Studio Elective	3 hr.
Art History*	3 hr.
Graduate Exhibition and Thesis**	6 hr.
Total	30 hr.

*Graduate credits in art history must be at the 300-level (graduate) and are in addition to courses taken or required at the undergraduate level.

**Graduate exhibition and thesis (Art 400) will include organized graduate seminars, committee meetings, and exhibition preparation discussions.

Master of Arts in Art Education

Art education is a popular option for graduate study in art. Specialization in art education requires the completion of 30 credit hours program. The exact course of study is determined through consultation with the student's advisor. The art education concentration may be completed in one year of full time study. The general distribution of graduate credits is as follows:

Art studio major area	9 hr.
Art studio elective	6 hr.
Art education or approved studies	12 hr.
Art 402 Master's in Art Education Project	3 hr.
Total	30 hr.

Every graduate student is required to complete a graduate project. The graduate art faculty recommend those students who may be required to hold a graduate exhibition.

Master of Arts in Art History

The art history concentration is accredited by the National Association of Schools of Art and Design. For information about this option, please contact the coordinator of art

history or the graduate advisor in the Division of Art. The general distribution of graduate credits for a concentration in art history is as follows:

Art history	21 hr.
Cognate courses	6 hr.
Art 401 (thesis)	3 hr.
Total	30 hr.

Master of Arts in Studio Art

The studio art concentration allows students to specialize in ceramics, graphic design, painting, printmaking, or sculpture.

Applicants desiring to begin a course of study leading to the Master of Arts in Art and concentration in the studio arts must have a baccalaureate degree in art or the equivalent. Undergraduate study should include 12 hours of art history, 45 hours of studio art related to professional needs, and 36 hours of general education courses.

The concentration in studio art requires:

Art Studio Major Area	18 hr.
Art Studio Elective or Graduate Seminar*	3 hr.
Art History**	6 hr.
Art 401 (Thesis)	3 hr.
Total	30 hr.

*In lieu of art studio elective instruction, students may take the graduate seminar course. Exact courses of study are determined in consultation with the graduate advisor.
**Graduate credits in art history must be at the 300-level (graduate) and are in addition to courses taken or required at the undergraduate level.

Requirements

The student must complete the stated degree requirements in order to graduate. These credits can be earned in one year. After consultation with the graduate advisor, students specializing in studio arts are required to prepare a study list of courses to be taken to satisfy Division of Art requirements. Changes in this list must be requested in writing and approved by the chairperson of the division.

Financial Aid

Financial aid information is available through the Student Financial Aid Office, West Virginia University, P.O. Box 6004, Morgantown WV 26506-6004. Graduate assistantships in art are awarded to students of exceptional promise by the faculty of the Division of Art. Application forms must be requested from the graduate advisor, Division of Art, College of Creative Arts, West Virginia University, P.O. Box 6111, Morgantown, WV 26506-6111, and submitted with the portfolio.

Art (ART)

- 200. *Directed Art Studies*. I, II, S. 1-15 hr. (May be repeated for credit.) PR: Consent. Studies in painting, sculpture, printmaking, graphic design, ceramics, drawing, art education, art history, includes independent study.
- 211. *Figure Drawing*. I, II, S. 3 hr. (May be repeated for credit.) PR: ART 12, 121 or equiv. A course in compositional structure from the figure.
- 212. *Advanced Drawing*. I, II, S. 3 hr. (May be repeated for credit.) PR: ART 211 or equiv. Advance tutorial drawing course.

300. *Independent Study Graduate Studio*. I, II, S. 1-15 hr. (May be repeated for credit.) PR: Consent. Intensive self directed research involving special projects in studio production. Areas of study include, but are not limited to, painting, drawing, printmaking, sculpture, ceramics, and design.
301. *Independent Study Art History*. I, II, S. 1-15 hr. (May be repeated for credit.) PR: Consent. Independent research, closely supervised, on topic of student's selection. Proposal must be well-defined and contain historical, critical, and theoretical issues. Contractual course.
313. *Graduate Painting*. I, II, S. 1-15 hr. (May be repeated for credit.) PR: Consent. Encompasses the significant issues and developments of contemporary painting, including visual resources, critical and pictorial structures, and technical proficiency to establish a coherent aesthetic vision in the medium.
323. *Graduate Graphic Design*. I, II, S. 1-15 hr. (May be repeated for credit.) PR: Consent. Integration of current and historic design resources leading to the development of a thesis project while working within the independent and existing design courses. Areas of special interest include the book arts and electronic multimedia.
324. *Graduate Graphic Design/Professional Practice*. I, II, S. 1-6 hr. (May be repeated for credit.) PR: Consent. Students assist and work on projects in a model studio setting, helping to coordinate and manage communication with clients, printers and undergraduate students in Graphic Design Studio 222.
326. *Graduate Sculpture*. I, II, S. 1-15 hr. (May be repeated for credit.) PR: Consent. Encompasses the significant issues and developments of contemporary 3-dimensional form, including visual resources, critical and historic foundations, and technical proficiency designed to establish a coherent comprehension of the media.
330. *Graduate Printmaking*. I, II, S. 1-15 hr. (May be repeated for credit.) PR: Consent. Encompasses the germane aspects of contemporary printmaking including visual resources, theoretical and historic structures, and technical processes, designed to establish a rigorous comprehension of the medium. Areas of specialization include lithography, intaglio, relief, serigraphy, and electronic media.
332. *Graduate Photography*. I, II, S. 1-15 hr. (May be repeated for credit.) PR: Consent. Involves the essential problems and developments of current photography, from traditional to digital photo process, theoretical and pictorial foundations and technical proficiency designed to afford a coherent aesthetic vision in the medium.
334. *Alternative Media*. I, II, S. 1-15 hr. (May be repeated for credit.) PR: Consent. Involves the primary issues and developments of alternative and interdisciplinary media such as installation, video, performance art, or handmade books along with the critical foundation and technical proficiency to establish a comprehensive utilization of chosen forms.
340. *Graduate Ceramics*. I, II, S. 1-15 hr. (May be repeated for credit.) PR: Consent. Involves the essential concerns and developments of contemporary ceramics, including traditional and current practices. Emphasis on technical processes designed to provide a rigorous comprehension and expression in clay. Areas of specialization include both functional and sculptural ceramics.

345. *Greek and Roman*. I, II. 3 hr. PR: Consent. Architecture, sculpture, and paintings of the Aegean world c. 200 BCE, Greece and Rome to 400 CE. Critical and historical consideration of this time period will be considered.
346. *Medieval Art*. I, II. 3 hr. PR: Consent. Arts of Europe from c. 312 to c. 1350. Theoretical, historical and literary contexts for the images will be established. Architecture, sculpture, painting, and portable arts will be included.
347. *Northern Renaissance*. I, II. 3 hr. PR: Consent. Arts of Northern Europe from 1350 to 1560 will be studied in an historical and theoretical context. Painting and sculpture will be the focus of study.
348. *Italian Renaissance*. I, II. 3 hr. PR: Consent. Early Renaissance through Mannerism. Emphasizes historical context and theoretical foundation of 15th and 16th Century Italian art and architecture.
349. *Baroque*. I, II. 3 hr. PR: Consent. Art of the late 16th through the early 18th centuries; Northern and Southern European examples. Issues of historical context and theoretical interpretation will be emphasized.
350. *Nineteenth Century*. I, II. 3 hr. PR: Consent. European and American art from the late 18th through 1990. Issues of theory, historical context, and literary foundation will be considered.
351. *Modern*. I, II. 3 hr. PR: Consent. The revolutionary experience of modern art, from its foundation in 19th century European movements through the 1950s. Critical theory and historical context will be stressed.
352. *American*. I, II. 3 hr. PR: Consent. Arts in the United States from the Colonial era to 1960. Emphasis placed on factors which define American art and the critical foundations for the works.
353. *Contemporary*. I, II. 3 hr. PR: Consent. Exploration of the various artistic movements from World War II to the present. Emphasis will be given to the change from modern to postmodern. Familiarity with images and critical texts will be expected.
354. *Art Theory*. I, II. 3 hr. PR: Consent. Examination of the development and tradition of the literature of Western art theory and its relationship to artistic practice.
355. *Women in Art*. I, II. 3 hr. PR: Consent. Examination of the art of female artists and of women as subjects in art. An historical view with concentration on 20th Century work. Critical theories will be emphasized.
356. *Twentieth Century Architecture*. S. 3 hr. PR: Consent. History of 20th Century architecture. Focus on development of the International Style and recent challenges to this modernist aesthetic.
365. *Graduate Art Education Studies*. I, II, S. 1-12 hr. (May be repeated for credit.) PR: Consent. Studies in art education and related areas. The development of a master's degree project in conjunction with a faculty committee.

400. *Graduate Exhibition/Thesis*. I, II, S. 3-6 hr. PR: Consent. Graduate exhibition and thesis. Research directed towards the production of a solo exhibition and a written thesis which documents the processes and philosophical principles of the artwork.

401. *Art History Thesis*. I, II, S. 3 hr. PR: Consent. Topic selected by student in consultation with art history faculty. Research must indicate familiarity with primary and secondary sources and regard for evidence of art historical research, methodology and criticism.

402. *Master's in Art Education Project*. I, II, S. 3 hr. PR: Consent. This course is for the final three hours of the Master's project. The in-depth project is to be completed, approved, and signed by the advising committee.

490. *Teaching Practicum*. I, II. 3 hr. PR: Consent. Supervised practices in college teaching. Developing aspects of college teaching experience such as writing a syllabus, organizing a classroom, or improvising with materials or topical issues.

496. *Graduate Seminar*. I, II. 3 hr. PR: Consent. Issues in Contemporary art. Analysis of theoretical issues and trends in contemporary art criticism. Emphasis on comparative media, interdisciplinary forms of expression, and significant cultural concerns that affect visual arts practice.

Music

Barton Hudson, Graduate Advisor, Division of Music
416-A Creative Arts Center

Degrees Offered: Master of Music, Doctor of Musical Arts, Doctor of Philosophy

The Division of Music is an accredited institutional member of the National Association of Schools of Music, the only nationally recognized accrediting agency for professional music instruction. All programs comply with the objectives and guidelines required by this organization.

Prospective graduate students in music are required to have completed the appropriate curriculum of undergraduate study in music at WVU or its equivalent at another institution of recognized standing. For acceptance into a degree program the applicant should make inquiry to the Director of Graduate Studies, Division of Music, P.O. Box 6111, Morgantown, WV 26506-6111.

Master of Music

- For the master of music degree, an undergraduate transcript showing an average of at least 3.0 on all undergraduate study is required for regular admission; for the Ph.D. and doctor of musical arts, a transcript showing an average of at least 3.0 on the master's degree or equivalent is expected;
- Results of the Graduate Record Examination (not required of performance M.M. applicants);
- Three letters of recommendation from individuals qualified to judge the applicant's potential success as a graduate student in music; the writers should submit the letters directly to the Director of Graduate Studies.

Performance

Applicants in performance and for the recital option in music education are also required to demonstrate, by audition or tape recording, the level of attainment in the

principal performance area which is prerequisite to the curriculum sought. The evaluation of performance proficiency is based on technical ability, repertoire, and musicianship. A listing of representative material for each performance area, graded by proficiency level, is available upon request.

If a tape recording is submitted, it must be of a high quality and have clearly indicated the student's name, titles and composers of works performed, and date of recording. Even the best recordings leave much to be desired, and a personal audition is encouraged. The auditions are normally administered by individually scheduled appointment. These should occur at least six weeks before registration.

Audition The audition for acceptance as a degree student, when required, is assessed for general admission purposes. The estimated proficiency level must be confirmed by a jury examination at the end of the first semester of applied study. Credit in performance may be counted toward degree requirements only after the proficiency level prerequisite has been reached.

Composition

Applicants seeking acceptance as composition majors must submit representative compositions for evaluation and approval. Evidence of previous teaching or professional experience is desirable in the consideration of doctoral applicants.

Music Education

Admission to the doctor of philosophy program with a specialization in music education is contingent upon the receipt of evidence that the applicant has held a position as a successful full-time contractual music teacher for at least three years. Such evidence may be in the form of a letter of recommendation from a school official.

All Fields

Applicants accepted for degree study must take tests in theory and music history, and audition on piano. In addition, voice students take diagnostic tests in vocal literature, diction, and pedagogy. The results of these tests may indicate the need for remedial study, which must be completed before admission to candidacy. Applicants for the areas of theory and composition will be tested more specifically in counterpoint (both sixteenth and eighteenth century), form, instrumentation, and orchestration.

Provisional Admission

Applicants whose averages and test scores do not meet the qualifications outlined above may be considered for acceptance as provisional or non-degree students. If, upon completion of up to 12 semester hours of graduate study, they have achieved a minimum of a B (3.0) average, and after any previous undergraduate deficiencies or other conditions have been satisfied, such students may be accepted as degree students.

GPA/Majors

Candidates must establish an overall grade-point average of 3.0 within a maximum of 30 or 36 hours, depending upon the requirements of the chosen curriculum. Applicants will be considered for candidacy upon completion of 12 semester hours of graduate study. No student will be admitted to candidacy before removal of all undergraduate deficiencies.

Candidates for the master of music degree may major in one of five fields: music education, performance, theory, composition, or history of music. In the latter four, a minimum of 30 hours is required. For music education requirements, see below.

Music Education Options

Students majoring in music education will be allowed one of four options, to be determined in consultation with the program consultant:

- Thesis option;
- Recital option (if the candidate demonstrates proficiency level 8 in the major performance area within the first 12 hours of enrollment);
- Thirty-six hour course work option; and
- Certification option (intended for persons possessing a bachelor's degree with a major in music other than music education), leading to eligibility for certification for teaching grades K-12 in the public schools of West Virginia.

For the first three options, the following requirements apply:

- Thirty graduate hours for thesis and recital options, 36 graduate hours otherwise, with a minimum average of 3.0.
- For the thesis or 36-hour options, four hours of performance, either MUSC 400 (principal performance area) or MUSC 310 (secondary performance area.)
- Demonstration of the ability to integrate music history, music theory, and music education by passing comprehensive written and oral examinations.
- Successful completion of a four-credit thesis or two-credit recital for the thesis and recital options, respectively.

For the certification option, a combination of graduate and undergraduate courses will be selected to satisfy certification requirements. The 36 graduate hours include 12 hours of graduate music education courses and electives chosen to provide a good background for teaching. Undergraduate courses may be necessary to make up deficiencies.

Requirements

History of Music

PR: Level 7 in the major performance area; Level 4 in piano; four semesters of a foreign language; seven hours upper-division theory; 15 undergraduate hours in music history.

MUSC 430 <i>Introduction to Music Bibliography</i>	3 hr.
Music History, chosen from MUSC 221-227	6 hr.
MUSC 491 <i>Special Topics</i>	6 hr.
Theory Elective	3 hr.
MUSC 497 <i>Research</i> (Thesis)	4 hr.
Electives (at least four credits in music)	8 hr.
Total	30 hr.

Music Education

PR: Level 2 in piano.

Music Education courses at the 300 or 400 level*

One theory course and one music history course

For Thesis Option:

MUSC 400 and/or 310 <i>Performance</i>	4 hr.
MUSC 497 <i>Research</i> (Thesis)	4 hr.
Electives	4-5 hr.

For Recital Option:

MUSC 398 <i>Master's Recital</i>	2 hr.
MUSC 400 <i>Performance</i> (major performance area)	6 hr.
Electives	4-5 hr.

For 36-hour Option:

MUSC 400 and/or 310 <i>Performance</i>	4 hr.
Electives	14-15 hr.
Totals	30 or 36 hr.

*Students in the thesis option must include MUSC 446.

Performance

PR: Level 10 in the major performance area, and Level 3 in piano; for organists, Level 5 in piano; for pianists in the piano pedagogy option, Level 9 in piano and one year of piano pedagogy/group or equivalent teaching experience; for voice majors, the same language requirements as for the B.M. degree.

MUSC 400 *Performance* (major performance area) 8 hr.

MUSC 430 *Introduction to Music Bibliography* 3 hr.

For Traditional Performance Option:

MUSC 398 *Master's Recital* 4 hr.

One of the following 2 hr.

MUSC 398 *Master's Recital*

MUSC 431 *Research Problems for Performers*

One theory course and one music history course

(chosen from Music 221-227) 5-6 hr.

Music electives

(no more than four hours in the major performance area) 7-8 hr.

Total 30 hr.

For Piano Pedagogy Option:

MUSC 398 *Master's Recital* 2 hr.

MUSC 312 *Studies in Keyboard Performance and Pedagogy* .. 6 hr.

MUSC 392 *Guided Studies* (Teaching internship) 4 hr.

One theory course or one music history course 2-3 hr.

Music electives 4-5 hr.

Total 30 hr.

For Conducting Option:

MUSC 398 *Recital* 6 hr.

MUSC 410, 411 *Conducting Seminars* 6 hr.

MUSC 335 or 336 *Studies in Vocal/Instrumental Music* 3 hr.

MUSC 467 *Analytical Techniques* 3 hr.

MUSC 468 *Compositional Techniques in 20th Century Music* .. 3 hr.

MUSC 470 *Transcription and Arranging* 2 hr.

Electives 2 hr.

Total 36 hr.

Composition

PR: Level 8 in the major performance area; Level 4 in piano; evaluation of previously completed compositions at a graduate major level.

MUSC 430 *Introduction to Music Bibliography* 3 hr.

MUSC 460 *Composition* 6 hr.

MUSC 468 *Compositional Techniques in Contemporary Music* 3 hr.

MUSC 475 *Pedagogy of Theory* 3 hr.

MUSC 483 *Theory Topics* 3 hr.

MUSC 497 *Research* (Thesis) 4 hr.

Music electives (must include one of the following): 8 hr.

MUSC 460 *Electronic Music Composition*

MUSC 467 *Analytical Techniques*

MUSC 470 *Transcription and Arranging*

Total 30 hr.

Theory

PR: Level 8 in the major performance area; Level 4 in piano.

Music 430 *Introduction to Music Bibliography* 3 hr.

Graduate music history 3 hr.

MUSC 467 *Analytical Techniques* 3 hr.

MUSC 468 <i>Compositional Techniques in Contemporary Music</i>	3 hr.
MUSC 475 <i>Pedagogy of Theory</i>	3 hr.
MUSC 483 <i>Theory Topics</i>	3 hr.
MUSC 497 <i>Research (Thesis)</i>	4 hr.
Electives (at least four credits in music)	8 hr.
Total	30 hr.

Additional Requirements

A representative public recital is required of candidates majoring in performance. Composition majors must submit as a thesis a composition in a large form. All candidates for the master of music degree are required to participate for credit for two semesters (or summer sessions) in a performing group which meets at least two clock hours per week and which is selected with the advisor's approval.

A general comprehensive oral examination must be passed by all candidates for the master of music degree. Unsuccessful candidates may repeat this examination after a three-month period. The results of the second oral examination will normally be considered final. The examining committee will decide immediately after an unsuccessful second attempt whether a petition for a third attempt will be granted.

Students must complete their programs in eight calendar years. Failure to do so will result in the loss of credit for courses taken at the outset of the program.

Doctor of Philosophy

The doctor of philosophy curriculum in music prepares students for careers as teachers in higher education. Acceptance into the doctoral program is competitive. Applicants to the program leading to the degree of Doctor of Philosophy must present necessary credentials for evaluation of previous training and experience to the Division of Music. These include scores on the Graduate Record Examination General Aptitude Test, submitted through the WVU Office of Admissions and Records, and evidence that the applicant has completed a minimum of 28 hours in liberal arts studies. Before admission to the program the Division may, at its discretion, require the applicant to take entrance tests in various fields of music, or it may require the applicant to be present for a personal interview. Under normal circumstances, the applicant must have maintained a minimum average grade of B (3.0) in courses taken for the master's degree. However, if sufficient professional experience should warrant, the Division may waive the requirement of a B (3.0) average or may grant an applicant conditional admittance subject to the satisfactory completion of certain specified courses or the attainment of a specified grade-point average within a semester's work.

Course Work The exact amount and nature of course work undertaken will be determined by the advisor with the approval of the student's doctoral committee in light of previous preparation and field of specialization. The student is expected to take Music 494 *Graduate Seminar* as required by the field of specialization. Whatever preparatory courses (languages, statistics, bibliography, etc.) are needed must necessarily be taken early in the course of study. A paradigm of recommended courses and other requirements is available upon request.

Candidacy Upon completion of the requirements of the Division of Music and the general WVU graduate studies requirements, the student will be recommended for admission to candidacy for the degree. These requirements are (in order of occurrence):

1. Demonstrate a satisfactory reading knowledge of German or French or satisfactorily complete Statistics 311-312. Upon recommendation of the advisor, a different romance language may be substituted for French.

2. Pass written qualifying examinations satisfactorily to show:
 - a. Broad knowledge in theory and in music history and literature.
 - b. Appropriate knowledge in the minor field.
 - c. Knowledge in depth in the field of specialization.
3. Pass satisfactorily a comprehensive oral qualifying examination.
4. Present and have accepted an outline and prospectus of the dissertation.

The requirement for doctoral seminars must be completed before the presentation of the prospectus. Graduate students who have met these requirements and who have maintained a minimum average of B (3.0) in courses completed shall be admitted to candidacy. The qualifying examinations shall be considered as one integral examination consisting of the written and oral parts. If the first attempt is unsuccessful, the student is allowed to try the entire examination a second time. The second attempt will be considered final. The applicant's committee may elect to discourage a second attempt if the first does not indicate probable success upon repetition.

Residence Requirements Completion of the requirements for this degree normally requires at least three years of full-time graduate work. A minimum of two consecutive semesters must be spent in residence in full-time graduate study at WVU beyond the master's degree or its equivalent.

Dissertation The candidate must submit a dissertation produced at WVU under the direction of a major professor which demonstrates a high order of independent scholarship, originality, and competence in research, and which makes an original contribution to the field of specialization.

After the dissertation has been approved and all other requirements have been fulfilled, the candidate's doctoral committee will administer the final oral examination. However, a final examination will not be given in the same semester as the qualifying examination. At the option of the student's committee, a final written examination may also be required. The final examination(s) shall be concerned with the dissertation, its contribution to knowledge, its relation to other fields, and the candidate's grasp of the field of specialization.

Following admission to candidacy, doctoral students are allowed five years to complete all remaining degree requirements. An extension of time may be permitted only upon repetition of the qualifying examination and completion of any other requirements specified by the student's doctoral committee.

Doctor of Musical Arts

The degree of doctor of musical arts may be taken in performance and literature (with specialization in piano, voice, percussion, or organ), or in composition. The primary objective is professional competence at the highest level. Historical and theoretical knowledge sufficient to support individualized interpretations for performers and original creative work for composers is also expected. Writing and speaking skills needed to communicate clearly and effectively are required. To assist the student in achieving these objectives, the course of study includes requirements in performance or composition, academic course work, and research.

Admission Acceptance into doctoral programs is competitive. Applicants to the program leading to the D.M.A. must present necessary credentials for evaluation of previous training and experience. These include scores on the Graduate Record Examination General Aptitude Test, submitted through the WVU Office of Admissions and Records, and evidence that the applicant has completed a minimum of 28 hours in liberal arts studies. Before admission to the program the Division may, at its discretion, require the applicant

to take entrance tests in various fields of music, or it may require the applicant to be present for a personal interview.

Under normal circumstances the applicant must have maintained a minimum average grade of B (3.0) in courses taken for the master's degree. However, if sufficient professional experience should warrant, the Division may waive the requirement of a B average or may grant an applicant conditional admittance subject to the satisfactory completion of certain specified courses or the attainment of a specified grade-point average within a semester's work.

Applicants in performance should submit copies of programs of recent major recitals. The applicant must be approved for the program by an audition committee by giving evidence of superior performance, artistic maturity, and extensive repertoire as specified under Graduate Performance Requirements. The audition committee will include the Chair of the Division of Music, the Director of Graduate Studies, the graduate program advisor in performance, and the major professors involved with the area of specialization.

Applicants in composition must be approved for the program after evaluation by the composition faculty of scores of the applicant's works, accompanied by recordings if possible. These should show successful handling of various forms and media and indicate the applicant's capacity to attain professional standing in the field.

Curriculum

The exact amount and nature of course work undertaken will be determined by the student's advisor with the approval of the doctoral committee in light of previous preparation and field of specialization. A paradigm detailing recommended courses and other requirements is available upon request.

Candidacy

Upon completion of the requirements of the Division of Music and the general WVU graduate studies requirements, the student will be recommended for admission to candidacy for the degree. These requirements are (in order of occurrence):

1. Demonstrate reading proficiency in a foreign language by successful completion either of an examination administered by the Division of Music or the equivalent of the fourth semester of recent language study with a minimum grade of B. The language must be of recognized world significance and appropriate to the student's field of concentration.

2. Pass written qualifying examinations satisfactorily to show:

- a. Broad knowledge in theory and music history and literature.
- b. Knowledge in depth of the literature of the field of specialization or of the craft of composition.

3. Pass satisfactorily a comprehensive oral qualifying examination.

Graduate students who have met these requirements and who have maintained a minimum average of B (3.0) in courses completed shall be admitted to candidacy. The qualifying examinations shall be considered one integral examination consisting of written and oral parts. If the first attempt is unsuccessful, the student is allowed to try the entire examination a second time. The second attempt will be considered final. The applicant's committee may elect to discourage a second attempt if the first does not indicate probable success upon repetition.

Residence Requirements

Completion of the requirements for this degree normally requires at least three years of full-time graduate work. A minimum of two semesters must be spent in residence in full-time graduate study at WVU beyond the master's degree or its equivalent.

Performance Requirements

Performance requirements (for performance majors) include private lessons, master classes in applied repertory, and public performance of at least two solo recitals and other types of presentations appropriate for the preparation of an artist-teacher, such as chamber music programs, concerto performances, major roles in opera or oratorio, or major accompaniments. Credit for each public performance is established in advance by the student's committee. Performances will be prepared under the direction of a WVU regular graduate faculty member.

Composition Requirements

Composition requirements (for composition majors) include private lessons and the creation of a composition portfolio. Credit for each composition is established by the student's committee prior to its completion; it will be subsequently evaluated on a pass-fail basis. Ten credits of the composition portfolio must be completed before admission to candidacy. Work on the major project may commence only after admission to candidacy.

Academic course requirements include courses in music history and theory, and, for performers, an appropriate course in the literature of the major performance area.

Research Requirements

Research requirements are intended to develop theoretical and historical investigative techniques sufficient to enable the performer to form valid individualized interpretations and to assist the composer in developing an original style. These requirements consist of the course *Introduction to Music Bibliography* (MUSC 430), demonstration of reading proficiency in a foreign language of major importance, for composers a doctoral seminar, and for all students a research project culminating in an extended written study related to the student's area, although not necessarily constituting original research. This project will be supervised by a regular graduate faculty member who is a member of the student's doctoral committee in consultation with the entire doctoral committee.

Final Examination

For performers, the final examination will consist of a major solo recital (which will be regarded as the equivalent of the Ph.D. dissertation defense). Immediately following the public performance the candidate's committee will meet to evaluate the performance as evidence of mature musicianship and finished technique. The final recital will not occur in the same semester as the qualifying examination.

For composers, when all compositions and the major project have been approved and all other requirements have been fulfilled, the candidate's doctoral committee will administer the final oral examination. At the option of the committee, a written examination may also be required. The final examination(s) shall be concerned with the compositions, the major project, and the candidate's grasp of the field of specialization and its relation to other fields. The final examination will not be given in the same semester as the qualifying examination.

Time Limitation

Following admission to candidacy, doctoral students are allowed five years to complete all remaining degree requirements. An extension of time may be permitted only upon repetition of the qualifying examination and completion of any other requirements specified by the student's doctoral committee.

Music (MUSC)

200. *Directed Music Studies*. I, II, S. 1-4 hr. (May be repeated for credit.) PR: Consent. Studies in performance, music education, music theory, music history, composition; includes directed or independent study in special topics.

210. *Piano Class Methods and Materials*. I. 3 hr. Methods, materials, and pedagogical techniques, including presentation of keyboard theory as used in functional piano. Practical organization of piano classes. Laboratory: observation of experienced class teacher and student teaching.

212. *History of Keyboard Pedagogy and Technic*. II. 3 hr. Study of keyboard development and technique, including pedagogical works of the eighteenth through twentieth centuries and application to specific teaching problems. Laboratory: student teaching and observation, emphasizing analysis and solution of technical problems.

213. *Introduction to Jazz Improvisation*. I. 2 hr. PR: MUSC 63, 64, and Proficiency Level 4. Development of improvisatory skills in the jazz idiom using melodic, harmonic, and rhythmic motives and patterns, and the application of knowledge of tonal centers, chord progressions, and functions.

214. *Advanced Jazz Improvisation*. II. 2 hr. PR: MUSC 213 or consent. Continuation of MUSC 213. Analysis of chord progressions with emphasis on chord substitutions, turnbacks, and scales. Development of jazz repertoire through performance.

218. *Repertoire*. I. 0-2 hr.

219. *Repertoire*. II. 0-2 hr.

221. *Music Before 1500*. I, II, or S. 3 hr. PR: MUSC 33-34 or consent. A study of sacred and secular monophony, Notre-Dame organa, thirteenth-century motet and conductus, and fourteenth- and fifteenth-century polyphony in France and Italy.

222. *Music of the Sixteenth and Seventeenth Centuries*. I, II, or S. 3 hr. PR: MUSC 33-34 or consent. A study of styles and forms from the High Renaissance to the Late Baroque.

223. *Music of the Eighteenth Century*. I, II, or S. 3 hr. PR: MUSC 33-34 or consent. A study of styles and forms of the Late Baroque through the Classic period.

224. *Music of the Nineteenth Century*. I, II, or S. 3 hr. PR: MUSC 33-34 or consent. A study of styles, forms, and theoretical concepts illustrative of nineteenth-century music.

225. *Music of the Twentieth Century*. I, II, or S. 3 hr. PR: MUSC 33-34 or consent. A study of stylistic trends during the twentieth century.

226. *History of Jazz*. I. 3 hr. History and repertory of jazz from its Afro-American origins to c. 1975 with attention to its major exponents (including Joplin, Armstrong, B. Smith, Morton, Ellington, Gillespie, Parker, Davis, Coltrane) and its evolving style.

230. *Music of Africa*. S. 3 hr. Traditional music of selected areas of Africa south of the Sahara with particular reference to East Africa. The diverse musical cultures with emphasis on historical background, instruments, ensembles, forms, and styles, and music in its social context.

239. *Collegium Musicum*. I, II. 1-2 hr. (May be repeated for credit.) PR: Consent. Study of outstanding musical works not in the standard repertory. Performance of vocal and instrumental music, investigation of performance practices, preparation of editions, and direction of rehearsals under supervision.

243. *Music Workshops*. I, II, S. 1-2 hr. (May be repeated for credit.)

248. *Music Arranging for Public School Groups*. I, II. 2 hr. PR: MUSC 66. Practical experience in techniques of making simple, workable arrangements of music for public school choral and instrumental performance groups.

260. *Upper-Division Composition*. I, II. 2 hr. (May be repeated for credit.) PR: Two semesters MUSC 160, or consent based on scores submitted. Creative writing with emphasis on practical composition for performance.

263. *Counterpoint*. I. 2 hr. PR: MUSC 68 or consent. Sixteenth-century counterpoint.

264. *Counterpoint*. II. 2 hr. PR: MUSC 68 or consent. Eighteenth-century counterpoint.

265. *Analysis of Musical Form*. II. 3 hr. PR: MUSC 68 or consent. Detailed study of the structure of music.

267. *Electronic Music*. I. 2 hr. PR: MUSC 68 and consent. Technology of producing electronic music. Methods of producing electronic compositions, relationship between sound signal and sound perceived, ear training, analysis of examples from electronic music literature, and composition of electronic music.

268. *Electronic Music*. II. 2 hr. PR: MUSC 267. Continuation of MUSC 267.

273. *Arranging for Small Jazz Ensemble*. I. 2 hr. PR: MUSC 171, and MUSC 173 or consent. Scoring, voicing, and arranging in various jazz styles, with emphasis on small ensembles comprising three to nine players.

274. *Arranging for Large Jazz Ensemble*. II. 2 hr. PR: MUSC 273 or consent. Continuation of Music 273, with emphasis on arranging for big band and studio jazz ensemble.

310. *Secondary Performance*. I, II, S. 1 hr. (May be repeated for credit.) Group or individual instruction in performance on a minor instrument (or voice), with emphasis on methods and materials for school music teachers.

312. *Keyboard Performance and Pedagogy*. I, II. 1-3 hr. (May be repeated for credit.) (Offered in one-credit modules of which students may take one or more each semester.) Pedagogy, repertoire, interpretation, and other topics which will enhance preparation of private piano teachers.

335. *Survey of Vocal Music*. I. 3 hr. PR: 6 hr. upper-division music history. Survey of masses, oratorios, cantatas and operas from late Renaissance to the twentieth century. Solo repertoire will not be included.

336. *Instrumental Music*. 3 hr. PR: 6 hr. upper-division music history or consent. Survey and analysis of orchestral and band music from the late Baroque to the present.

343. *Contemporary Techniques in Classroom Music*. 3 hr. PR: MUSC 152 or consent. Principles and practice of contemporary techniques in elementary and junior high school classroom music, including those of Orff and Kodaly.

344. *Appalachian Music for the Classroom*. I. 3 hr. Lecture, demonstration, and practical experience in performance of Appalachian vocal and instrumental music and in use of this music in public school classrooms. May involve field trips and construction of inexpensive instruments.

346. *Music making in Middle school/Junior High*. II. 3 hr. PR: MUSC 151, 152, equiv., or consent. Identification and sequencing of appropriate concepts and skills for general music class students. Selection and use of materials including popular music. Emphasis on student music-making activities. Evaluation procedures included.

347. *Music in Early Childhood*. S. 3 hr. PR: MUSC 151, 152, or equiv., or consent. Musical experiences for children three through ten years. Emphasis on intellectual, physical and social/emotional needs and characteristics of children. Materials and activities for developing music concepts, skills, and positive response.

357. *Instrumental Methods and Materials*. 3 hr. PR: MUSC 51, 44, and 45. Methods, materials, and administration of K-12 instrumental music programs; sequential instruction; conceptual and skill development; aural and reading competencies in music. Bi-weekly lab. 3 hr. lec.

358. *Choral Music Methods and Materials*. 3 hr. PR: MUSC 49 and 51. Methods, materials, and administration of choral music programs; sequential instruction; conceptual and skill development; teaching aural and reading competencies. Bi-weekly lab. (3 hr. lec.)

359. *General Music Methods and Materials*. 3 hr. PR: MUSC 51. Introduction to major pedagogical approaches used in K-12 general music classrooms; examination and development of materials and curricula; analysis of teaching and learning styles. Bi-weekly lab. 3 hr. lec.

392. *Guided Studies in Music*. I, II, S. 1-3 hr. PR: Graduate standing and consent. Intensive individualized reading reported in group discussions. Course may be repeated as many times as necessary, in as many areas as needed; different sections (i.e. areas) may be pursued simultaneously.

398. *Master's Recital*. I, II, S. 1-4 hr. PR: MUSC 299 (Senior Recital) or consent. Master's Applied students shall be permitted to give a recital only after they pass a qualifying audition before a designated faculty committee in a semester previous to that in which the recital is to be given.

400. *Performance*. I, II. 1-4 hr. (Open to qualified students in any field in Performance. May be repeated.) Normally offered for two credits (one 30-minute lesson per week) or four credits (one 60-minute) lesson per week. A student must demonstrate ability of grade-level 4 on an instrument to receive credit in MUSC 400 on that instrument.

409. *Master Class in Applied Repertoire*. I, II. 2 hr. (May be repeated for credit.) PR: Consent. Designed to give coverage through performance of the literature of a specific D.M.A. Performance field.

410. *Conducting*. S. 3 hr. PR: MUSC 53 or equiv. Instrumental and choral conducting. Major works are prepared and conducted through the use of recordings and music organizations.
411. *Conducting Seminar*. 3 hr. PR: MUSC 410. Instrumental and choral conducting of major works under the supervision of the conductor of a major ensemble.
419. *Opera Theatre*. I, II. 0-4 hr. PR: MUSC 19 or consent. Continuation of Music 19. Performance of major roles and advanced production techniques. Qualified students will undertake production-direction projects under supervision.
423. *Keyboard Literature*. S. 3 hr. PR: MUSC 218, 219. Intensive study of the literature for keyboard instruments and the history of the literature.
424. *Song Literature*. S. 1-3 hr. PR: MUSC 218, 219. Intensive study of the Art Song and the Lied and the history of their development.
429. *Survey of Sacred Music*. S. 4 hr. PR: MUSC 33, 34 or equiv. Study of music suitable to the liturgical year, including the historical background of the Jewish, Catholic, and Protestant liturgies.
430. *Introduction to Musical Bibliography*. I. 3 hr. PR: MUSC 33 and 34 or equiv. Survey of musical bibliography with appropriate research assignments.
431. *Research Problems for Performers*. II. 2 hr. PR: MUSC 430. Discussion of problems of music literature, performance practice, history, and instruments; preparation of a research paper under individual supervision.
433. *Seminar in Ethnic Music*. II. 3 hr. PR: Consent. Open to graduate music majors only. Examination of selected ethnic music from Africa, Asia, and Latin America. Focuses on music, instruments, and performance techniques and practices of these regions, and how the music functions in society.
438. *History of Notation*. II. 3 hr. PR: Graduate standing. Detailed study in transcribing the musical manuscripts of the Middle Ages.
439. *History of Notation*. II. 3 hr. PR: Graduate standing. Continuation of MUSC 438 covering the Renaissance period.
440. *Choral Techniques*. II. 2 hr. PR: MUSC 151, 152 or equiv. Advanced techniques and procedures involved in development of choral ensembles.
442. *Instrumental Techniques*. I. 2 hr. PR: MUSC 151, 152, or equiv. Advanced techniques and procedures involved in individual performance and instruction through lecture demonstrations by performance faculty.
443. *Historical Foundations of Music Education*. 3 hr. Examination of the history of music education from classical antiquity to the present, with particular emphasis on practices in the United States; examination and application of historical research methods. 3 hr. lec.
444. *Music Education*. II. 3 hr. PR: MUSC 151, 152 or equiv. Survey and critical study of the total music education program.

445. *Supervision of Music*. II. 2 hr. PR: MUSC 151 or 152, or equiv. Concepts, responsibilities, duties and techniques that the supervisor needs to effectively exercise leadership in developing, coordinating, and refining the complete Music Education program in public schools from kindergarten through twelfth grade.
446. *Introduction to Research in Music Education*. I. 3 hr. PR: MUSC 151, 152, or equiv. Methods and measures necessary for conduct and understanding of research in music education.
448. *Psychology of Music Learning*. 3 hr. Application of learning theory to music learning; nature of musical talent; music talent testing.
449. *Psychology of Music*. II. 3 hr. Introductory study of musical acoustics and psychology of perception of music.
460. *Composition*. I, II. 3 hr. (May be repeated for credit.) PR: Consent. Primarily for candidates for graduate degrees in theory or composition.
467. *Analytical Techniques*. I, II, or S. 3 hr. Analytical techniques and their application to scholarship and performance, with emphasis on pre-twentieth century styles.
468. *Compositional Techniques in Contemporary Music*. I, II, or S. 3 hr. Analysis of twentieth-century music.
470. *Transcription and Arranging*. I, II. 2 hr. (May be repeated once for credit.) PR: MUSC 172 or equiv. Major projects in scoring for orchestra, band, or wind ensemble.
475. *Pedagogy of Theory*. I, II, or S. 3 hr. PR: MUSC 68 or consent. Consideration of various approaches to the teaching of theory.
483. *Theory Topics*. I, II, or S. 3 hr. (May be repeated for max. 8 hr. credit.) Various types of analytical and theoretical problems and approaches to their solutions.
488. *Doctoral Recital*. I, II, S. 1-4 hr. PR: MUSC 398 (Master's Recital) or consent. Master's Applied students shall be permitted to give a recital only after they pass a qualifying audition before a committee of at least three specialists in the area in a semester previous to that in which the recital is to be given. Acceptance of the recital will be at the discretion of the student's doctoral committee.
489. *Lecture Recital*. I, II. 2 hr. PR: MUSC 430.
491. *Special Topics*. I, II. 1-3 hr.
492. *Directed Study*. I, II. 1-8 hr. PR: Consent, which in some cases may be contingent upon doctoral foreign language examination or a course in statistics. Intensive individualized reading reported in group discussions. Course may be repeated as many times as necessary, in as many areas as needed; several different sections (i.e., areas) may be pursued simultaneously.
494. *Special Seminar*. I, II. 2 hr. (May be repeated for max. 8 hr. credit.) PR: Consent. Intensive individual investigation and preparation of research papers. Presented by the combined doctoral staff in music.

496. *Graduate Seminar*. I, II. 1 hr. PR: Consent.

497. *Research*. I, II. 1-15 hr. PR: MUSC 430 or consent.

498. *Thesis*. I, II. 2-4 hr. PR: Consent.

Theatre

William J. Winsor, Interim Chairperson

307-A Creative Arts Center

Degree Offered: Master of Fine Arts

The Division of Theatre at WVU offers the master of fine arts as the terminal degree in theatre, with concentrations in acting and theatre design (scene, costume, and lighting).

Admission

Prospective candidates for the degree of master of fine arts in theatre must have a B.A. or B.F.A. degree or equivalent from an accredited institution. Ordinarily, a minimum of 30 semester hours in theatre at the undergraduate level is expected to have been completed with a grade-point average of no less than 2.75, although students with an undergraduate grade-point average of 2.25-2.5 may be admitted with probationary status.

Auditions

Applicants must audition/interview. Applicants intending to specialize in acting must submit a complete resume of their acting experience, at least two letters of recommendation from acting coaches or directors, and must present an audition before at least one member of the acting faculty. Those intending to specialize in design must submit a complete portfolio of their work, a resume of their design experience, and at least two letters of recommendation from design instructors or directors. An interview with at least one member of the design faculty is also required.

For further details regarding these requirements, address inquiries to: Chairperson, Division of Theatre, College of Creative Arts, West Virginia University, P.O. Box 6111, Morgantown, WV 26506-6111.

Advanced Standing

Students may be eligible for 18 hours of graduate transfer credit for advanced standing if they meet the regular requirements of graduate admission. Students admitted with advanced standing are required to be in residence at WVU for a minimum of two semesters and a summer session. The request for advanced standing should be made to the Division Chairperson at the time of application.

Master of Fine Arts Degree Programs

For the master of fine arts degree, students must complete requirements for one of the following two programs:

Acting The acting option is a highly disciplined period of training that focuses on performance. Students will explore basic exercises leading to intensive scene work fully supplemented by technique courses in voice, speech, and movement. The actor takes courses in various areas that are essential to his/her craft (theatre history, text analysis, criticism, etc.) in order to strengthen his/her background. However, the greatest part of

time is centered in the studio work every afternoon from 1:00 to 5:00 p.m. Each week, ten hours are spent on acting, four to six hours on voice and speech, and four to six hours on movement.

Successful completion of the minimum number of required graduate hours in one of the two following programs:

- Two academic years and one summer of graduate course and production work totaling 59 credit hours;
- A performance thesis project;
- Oral defense of the thesis project;
- A successful evaluation following the completion of the first year; and
- Overall 3.0 grade-point average.

Design The design option is a three-year course of study for students seeking professional preparation leading to the M.F.A. degree in scenic, costume, or lighting design.

Studio design courses, together with practical laboratory exercises, progressively offer students challenges related to the expectations found in the commercial world.

- Three academic years of graduate course and production work totaling 67 credit hours;
- A production thesis or research design project; and successful oral defense.
- A successful evaluation following the completion of the first and second years; and
- Overall 3.0 grade-point average.

M.F.A. in Acting Suggested Program

Semester I

THET 375 <i>Acting</i>	3 hr.
THET 351 <i>Voice and Speech</i>	2 hr.
THET 371 <i>Movement</i>	2 hr.
THET 491 <i>Makeup</i>	1 hr.
THET 331 <i>Research</i>	3 hr.
THET 200 <i>Text Analysis</i>	3 hr.
	14 hr.

Semester II

THET 376 <i>Acting</i>	3 hr.
THET 352 <i>Voice and Speech</i>	2 hr.
THET 372 <i>Movement</i>	2 hr.
THET 200 <i>Text Analysis</i>	3 hr.
THET 460 <i>Theatre History</i>	3 hr.
	13 hr.

Semester III (Summer)

THET 278 <i>Repertory Theatre</i>	9 hr.
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Semester IV

THET 353 <i>Voice and Speech</i>	2 hr.
THET 373 <i>Movement</i>	2 hr.
THET 377 <i>Acting</i>	3 hr.
THET 386 <i>Criticism</i>	3 hr.
THET 400 <i>Performance Thesis</i>	3 hr.
	13 hr.

Semester V

THET 374 <i>Movement</i>	2 hr.
THET 354 <i>Voice and Speech</i>	2 hr.
THET 378 <i>Acting</i>	3 hr.
THET 400 <i>Performance Thesis</i>	3 hr.
	10 hr.
TOTAL	59 hr.

M.F.A. Scene Design Suggested Program

Semester I

THET 220 <i>Costume History & Design</i>	3 hr.
THET 367 <i>Scene Design</i>	3 hr.
THET 361 <i>Sceno-graphics</i>	3 hr.
THET 331 <i>Research Methods</i>	3 hr.
	12 hr.

Semester II

THET 221 <i>Costume History & Design</i>	3 hr.
THET 225 <i>Theat. Rigging Electricity</i>	3 hr.
THET 3647 <i>Scene Design</i>	3 hr.
THET 379 <i>Rehearsal & Performance</i>	1 hr.
THET 262 <i>Scene Painting</i>	3 hr.
	13 hr.

Semester III

THET 367 <i>Scene Design</i>	3 hr.
THET 369 <i>Lighting Design</i>	3 hr.
THET 386 <i>Dramatic Criticism</i>	3 hr.
THET 379 <i>Rehearsal & Performance</i>	3 hr.
	12 hr.

Semester IV

THET 367 <i>Scene Design</i>	3 hr.
THET 369 <i>Lighting Design</i>	3 hr.
THET 379 <i>Rehearsal & Performance</i>	3 hr.
THET 395 <i>Period Styles</i>	3 hr.
	12 hr.

Semester V

THET 400 <i>Thesis</i>	3 hr.
THET 379 <i>Rehearsal & Performance</i>	3 hr.
THET 334 <i>Portfolio Preparation</i>	3 hr.
	9 hr.

Semester VI

THET 400 <i>Thesis</i>	3 hr.
THET 333 Sem. <i>Production Research</i>	3 hr.
Elective	3 hr.
	9 hr.
TOTAL	67 hr.

Similar curriculum tracks are offered in costume design and lighting design with course work specific to each discipline.

Theatre (THET)

200. *Directed Theatre Studies*. I, II. 3-12 hr. (May be repeated for max. 12 hr. credit.) PR: Consent. Studies in theatre history, performance, stage design and technology, and theatre crafts. Subject matter and number of sections varies from semester to semester.

201. *Advanced Costume Construction*. I, II. 3 hr. (May be repeated for max. 12 hr. credit.) PR: THET 105. Study and practical application of costume construction through flat pattern, draping, and period projects. Production assignments on theatre productions
205. *Stagecraft 2*. II. 3 hr. PR: THET 100, 161. Detailed study of scenery construction and technical theatre. Emphasis on research projects, advanced sceno-graphics and problem solving techniques. Practical experience through work on productions.
220. *Costume History 1*. I. 3 hr. PR: THET 105, 167. Detailed study of the history of clothing, from ancient Egypt through the early Renaissance, as it relates to costume design for the stage. Practical experience in the development and presentation of costume designs based on historical clothing.
221. *Costume History 2*. I. 3 hr. PR: THET 220. Detailed study of the history of clothing, from the late Renaissance through the present, as it relates to costume design for the stage. Practical experience in the development and presentation of costume designs based on historical and contemporary clothing.
223. *Costume Crafts*. II. 3 hr. PR: THET 105, 201. Identification and application of the materials and techniques used in the fabrication of costume crafts. Emphasis on research and practical experience through "hands-on" project work.
225. *Advanced Technical Production*. II. 3 hr. PR: THET 100, 107. Study of advanced technical theatre procedures including rigging, welding, new materials, and special effects. Emphasis on safe practices and development of skills through projects.
262. *Scene Painting*. I. 3 hr. PR: THET 2647 or 367 or consent. An introduction to the basic tools, materials and techniques of scene painting for the stage.
278. *Repertory Theatre*. S. 1-6 hr. (May be repeated for max. 12 hr. credit.) PR: Consent. Rehearsal and performance techniques for producing plays in rotating repertory. Emphasis is on the creation of a synthesized company of performers, designers, and technicians.
280. *Advanced Play Directing*. II. 3 hr. PR: THET 180 or consent. Emphasis on the work of the director as an integrating artist. High level of proficiency in the direction of a one-act play is required of all students enrolled.
282. *Creative Dramatics*. I, II, S. 3 hr. PR: THET 75 or consent. Study and practice of creative dramatic activity as a method of learning and self development for children.
284. *Puppetry*. I, II. 3 hr. PR: THET 75 or consent. Comprehensive survey of construction and manipulation techniques of puppets. Evaluation of role of puppetry in child behavior and therapy techniques.
290. *Playwriting*. I, II. 3 hr. PR: Consent. Development of basic playwriting techniques. Specific assignments explore characterization, dramatic event, dialogue, tension, compression. Emphasis on the student finding his own voice, style, and courage to dramatize his view of the world.

291. *Advanced Playwriting*. II. 3 hr. PR: THET 290. Further exploration of dramatic technique, with emphasis on orchestrating the longer play. Also touches on script analysis of known dramatic texts and on practical problems of a playwriting career.
295. *Classic Theatre to 1700*. I. (Alternate Years.) 3 hr. A survey of theatre history, with emphasis on the development of performance conditions, from classical antiquity through the middle of the seventeenth century.
296. *European and American Theatre, 1700-1850*. II. 3 hr. A survey of theatre history, with emphasis on the development of performance conditions, from the middle of the seventeenth century to the rise of Realism in the 1840s.
297. *Modern Theatre, 1850-1940*. I. (Alternate Years.) 3 hr. A survey of theatre history, with emphasis on the development of performance conditions, from the middle of the nineteenth century to the outbreak of World War II.
298. *Contemporary Theatre Since 1940*. II. (Alternate Years.) 3 hr. A survey of theatre history, with emphasis on the development of performance conditions, from World War II to the present.
307. *Sound Seminar*. II. 3 hr. An exploration of sound design for the theatre with practical emphasis on producing and recording sound effects.
331. *Research Methods and Survey*. I. 3 hr. PR: Consent. Research methods and techniques for theatre artists, scholars, and designers.
333. *Seminar in Production Research*. II. 3 hr. PR: THET 331, 367. Seminar approach to individual design projects with oral and written presentation of research materials. Intensive critique within class by faculty and peers.
334. *Professional Aspects of Design*. I. 3 hr. PR: THET 367, 368, 369. An in-depth work in the packaging and presentation of the design portfolio, resume writing, and job opportunities. Emphasis is placed on methods of making a successful transition from an academic environment into the performance industry.
351. *Graduate Voice Techniques*. I. 2 hr. PR: Consent. In depth vocal work, with special care taken to address each actor's individual qualities, beginning with breath, alignment, and release of habitual tension. Open resonance and free articulation to support the actor's voice.
352. *Graduate Voice Techniques*. II. 2 hr. PR: Consent. Continue the work introduced in THET 351 with text exploration. Introduce the International Phonetic Alphabet (IPA) and structure.
353. *Advanced Graduate Vocal Techniques*. I. 2 hr. Intensive vocal exploration with Shakespearean text, character choices, and dialect work.
354. *Advanced Graduate Vocal Techniques*. II. 2 hr. PR: Consent. Continuation of THET 353 with emphasis on period style texts and voice-over skills.

361. *Graduate Sceno-Graphic Techniques*. I. 3 hr. Advanced techniques in drafting in accordance with current graphic standards for stage design and technology. Refinement of technique and graphic style through projects and exercise.
362. *C.A.D.D. for the Stage*. 3 hr. PR: THET 361, 367, or consent. Advanced study of the graphic applications of computer assisted design and drafting for stage design through project work and exercises.
367. *Graduate Scene Design*. I, II. 3 hr. (May be repeated for maximum of 9 hr.) Lecture/studio; Intensive practical experience in the creation of the scenic environment. Emphasis is placed on the conceptualization, drafting, rendering, and model building techniques related to the development and presentation of scenic design.
368. *Graduate Costume Design*. I, II. 3 hr. PR: THET 220, 221. (May be repeated for a maximum of 9 hr.) Lecture/studio; Intensive practical experience in the design of stage costumes. Emphasis is placed on conceptualization, characterization, and rendering techniques related to the development and presentation of costume design.
369. *Graduate Lighting Design*. I, II. 3 hr. PR: THET 203 or consent. (May be repeated for a maximum of 9 hr.) Lecture/studio; Intensive practical experience of lighting design for the theatre. Emphasis is placed on conceptualization, drafting, and rendering techniques related to the development presentation of lighting design.
371. *Graduate Stage Movement*. I. 2 hr. PR: Consent. Development of awareness of the actors' physical apparatus utilizing movement techniques and mask work to explore basic alignment, neutrality, and breath/gesture principles.
372. *Graduate Stage Movement*. II. 2 hr. PR: Consent. Continuation of the work in THET 371 through specific applications in project studies.
373. *Advanced Graduate Stage Movement*. I. 2 hr. PR: Consent. Advanced study of movement techniques for character work, including rhythms of basic language/movement connections and period styles of movement.
374. *Advanced Graduate Stage Movement*. II. 2 hr. PR: Consent. Continuation of the work in THET 373 through specific applications in project studies.
375. *Graduate Acting Studio*. I. 3 hr. PR: Consent. Foundation of the craft of acting including sensory elements and environment, personalization, communication, and conflict. Scene study with concentration on contemporary American realism and refinement of audition techniques.
376. *Graduate Acting Studio*. II. 2 hr. PR: Consent. Rehearsal and presentation of Realism and extended Realism projects utilizing plays which are ensemble in nature to explore and deepen the acting process.
377. *Advanced Graduate Acting Studio*. I. 2 hr. PR: Consent. Acting Shakespeare; monologue and scene study, text, verse scansion, and exercise work.
378. *Advanced Graduate Acting Studio*. II. 3 hr. PR: Consent. Rehearsal and presentation of style project (Shakespeare, Comedy of Manners, Shaw, etc.); acting for the camera and the business of acting.
379. *Rehearsal and Performance*. I. 3 hr. (May be repeated for max. 12 hr. credit.) PR: Consent. Participation in assigned performance projects.

395. *Period Style 1*. I. 3 hr. (Alternate years) An in-depth exploration of architecture, costumes, customs, and ornamentation in period style for the theatre from Egyptian through Contemporary.

400. *Performance Thesis*. I, II. 3 hr. PR: Consent. Creative performance project. Requires the production of a written record which traces the acting or design process as it develops during planning, rehearsal, and performance.

460. *Specialized Seminars*. 3-9 hr. (May be repeated for max. 9 hr. credit.) PR: Consent. Selected fields of study in theatre.

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

497. *Research*. I, II. 1-15 hr.

499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking course work credit but who wish to meet residence requirements, use University facilities, and participate in its academic and cultural programs.

School of Dentistry

Robert N. Moore, D.D.S., Ph.D., Ed.D., Dean

William R. McCutcheon, D.D.S., M.P.H., Associate Dean

James E. Overberger, D.D.S., M.S., Associate Dean

Rodney L. Powers, D.D.S., Assistant Dean

Frank H. Stevens, D.D.S., Assistant Dean

The School of Dentistry was established by an act of the West Virginia Legislature on March 9, 1951, and offers baccalaureate, professional, and advanced degrees. The school is located on the first floor of the Health Sciences Center North. Modern clinical facilities include over 140 treatment areas and new state-of-the-art clinical and preclinical simulation teaching laboratories.

The majority of the faculty are full-time and have had advanced education in all of the recognized specialty areas. All programs are fully accredited by the Commission on Accreditation of the American Dental Association. The School will be expanding its specialty and research areas as additional space and funds become available.

The School of Dentistry offers several advanced education programs beyond the D.D.S. and B.S. degrees.

The Department of Endodontics offers a program of advanced study and clinical training leading to the master of science degree. The program requires a minimum of 24 months (two academic years and two summers) of full-time residency in the School of Dentistry. The program is designed to qualify dentists for careers in endodontic clinical practice, teaching, and research.

The Department of Orthodontics offers a program of advanced study and clinical training leading to the master of science degree. The program requires a minimum of 34 months (three academic years and two summers) of full-time residency in the School of Dentistry. The program is designed to qualify dentists for careers in orthodontic clinical practice, teaching, and research.

The Department of Dental Hygiene offers a program of advanced study and specialized training leading to the master of science degree. The program requires the completion of a minimum of 36 semester hours through full- or part-time enrollment in the School of Dentistry. The program is designed to qualify dental hygienists for careers in teaching, administration, and management.

The School of Dentistry offers one four-year residency in oral and maxillofacial surgery, eight one-year general practice residencies, and two one-year advanced education in general dentistry residencies.

Graduates of both North American and international dental schools are considered for admission to the dental specialty programs. Graduate assistantships are available in the second year of the endodontic program and the third year of the orthodontic program. Stipends are provided for the residency programs.

Information concerning admission requirements and courses of study may be obtained from the Office of the Associate Dean for Academic and Postdoctoral Affairs, WVU School of Dentistry, P.O. Box 9402, Health Sciences Center, Morgantown, WV 26506-9402. Telephone (304) 293-3549, fax (304) 293-2859, e-mail mpowley@wvuaphs1.hsc.wvu.edu.

Graduate Programs

Dental Hygiene M.S.

Dental Specialties M.S.

Professional Degree

Dentistry D.D.S.

(Please see the Robert C. Byrd Health Sciences Center Catalog.)

Graduate Faculty

† Indicates regular membership in graduate faculty.

* Indicates associate membership in graduate faculty.

Professors

†Richard J. Crout, D.M.D., Ph.D. (U. Pitt.). Periodontics. Drug therapy and pharmacology.

†Christina B. DeBiase, Ed.D. (WVU). Hospital dental hygiene, Curriculum and administration.

†Marcia A. Gladwin, Ed.D. (U. Ky.). Dental hygiene, Dental materials, Ethics, Curriculum.

†Catherine E. Graves, M.A. (WVU). Dental hygiene, Computer application, Geriatrics.

*Robert W. Graves, D.D.S. (WVU). Chairperson. Oral and maxillofacial surgery, Pharmacy, Drug therapy and pharmacology.

*Robert H. Hornbrook, D.D.S., M.S.D. (WVU). Periodontics, Treatment therapy.

*Robert M. Howell, D.D.S., M.S.D. (MCV). Chairperson, Oral pathology.

†Gordon G. Keyes, D.D.S., M.S., J.D. (U. Md.). Oral pathology, Legal aspects.

†Barbara K. Komives-Norris, M.S. (Ohio St. U.). Director, Dental hygiene. Educational administration.

†William R. McCutcheon, D.D.S., M.P.H. (WVU). Associate Dean. Dental public health, Behavioral dentistry.

*Robert N. Moore, D.D.S., Ph.D., Ed.D. (Northwestern). Dean. Orthodontics, Craniofacial growth, Muscle physiology.

†Peter W. Ngan, D.M.D. (Harvard). Chairperson. Orthodontics, Craniofacial growth and development, Appliance therapy.

†James E. Overberger, D.D.S., M.S. (U. Pitt.). Associate Dean. Materials science, Prosthodontics.

*Robert G. Pifer, D.D.S. (WVU). Chairperson. Oral radiology, Treatment planning.

†Norton P. Smith II, D.D.S. (WVU). Fixed prosthodontics, Computers.

†Carol A. Spear, M.S. (U. Mich.). Dental hygiene related topics, Instrumentation, Infection control, Education.

†Robert N. Stuchell, D.M.D. (U. Pitt.). Preventive dentistry, Treatment therapy.

Associate Professors

†C. Russell Jackson, D.D.S., M.S. (WVU). Endodontics, Pulpal trauma.

†Thomas F. Razmus, D.D.S., M.S. (U. Mich.) Radiology/imaging, Oral medicine, Oral diagnosis/treatment planning.

*M. Jerry Todd, D.D.S., M.S. (Creighton). Director. Endodontics, Biology, Psychology.

Assistant Professors

†Michael D. Bagby, D.D.S., Ph.D. (Loyola). Biomaterials, Restorative dentistry.

*K. Birgitta Brown, D.M.D. (Wash. U.). Operative dentistry, Geriatrics.

*Hera Kim, D.D.S., M.M.Sc. (SUNY–Stony Brook). Orthodontics, Orthodontic bracket strengths, Dental materials.

†Mark W. Richards, D.D.S., M.Ed. (U. Wash.). Chairperson. Prosthodontics, Implantology.

†Louise Tupta-Veselicky, D.D.S., M.Ed. (WVU). Periodontics, Treatment therapy.

Dental Hygiene

Barbara K. Komives-Norris, Director, Division of Dental Hygiene

Christina B. DeBiase, Coordinator of the Graduate Program

1073 Health Sciences North

Degree Offered: Master of Science

The School of Dentistry and its Division of Dental Hygiene offer a program of advanced study and specialized training leading to the degree of Master of Science. This program requires a minimum of 36 semester hours through full-time or part-time enrollment in the School of Dentistry. It is designed to qualify dental hygienists for careers in teaching, administration, research and management.

The areas of emphasis in the master of science program in dental hygiene are office management, special patients, education/administration and basic sciences.

Options for concurrent master's degrees in the area of community medicine or public administration are also available.

Application Deadlines

Inquiries concerning this program should be directed to the Office of the Associate Dean for Academic and Postdoctoral Affairs, School of Dentistry. Applications should be filed by July 1 for fall admission and by November 1 for spring enrollment.

- A baccalaureate degree in dental hygiene from an accredited dental hygiene program or a baccalaureate degree in another field of study from an approved institution of higher education while holding a certificate or associate's degree in dental hygiene from a program fully accredited by the American Dental Association Commission on Dental Accreditation

- Evidence of scholastic and clinical achievement to indicate the applicant's ability to progress in a program of this nature. Generally, a minimum grade-point average of 2.75 or above is required

- Completion of one of these standardized tests: the Graduate Record Examination (GRE) general aptitude test with a score of 1,000 or above, or the Miller Analogies Test with a score of 50 or above

- Submission of all information requested in the graduate application to the Office of the Associate Dean for Academic and Postdoctoral Affairs.

Degree Requirements

- Completion of a minimum of 36 semester credit hours: 23 required credit hours and 13 credit hours in an elective area(s) of emphasis. Four elective areas of emphasis are offered. The student may choose one or two of these areas of study. Courses within these specializations are taught by a number of schools or colleges within the University. An individualized program will be devised for each student which includes a maximum of six hours in research leading to an acceptable thesis. Oral defense of the thesis is required.

GPA

- Achievement of a 3.0 GPA or an overall academic average of at least a B in all work attempted in the master's program. A grade of C or below in two courses will require a faculty review of the student's progress. A third C will result in suspension from the program.

- Removal of all conditions, deficiencies and incomplete grades. Credit hours for courses with a grade lower than C do not count toward degree requirements.

ED P 311 <i>Statistics</i>	3 hr.
ED P 330 <i>Test and Measurement</i>	3 hr.
DTHY 380 <i>Critical Issues in Health Care</i>	3 hr.
DTHY 381 <i>Expanded Functions</i>	3 hr.
DENT 391 <i>Microcomputing in Dentistry</i>	2 hr.
DTHY 385 <i>Research Methods for the D.H.</i>	3 hr.
DTHY 397 <i>Research (Thesis)</i>	6 hr.
Total	23 hr.

Elective Area(s) of Dental Hygiene Specialization

Dental Hygiene 391 and Dentistry 391 courses

Courses taught by the School/College of:

Business and Economics

Human Resources and Education

Medicine

Courses taught by the Department of Community Health

Total 36 hr.

Dental Hygiene (DTHY)

380. *Dental Hygiene Seminar and Practice 1*. I. 3 hr. PR: Graduate standing and consent. Examination of the critical environmental issues affecting the future of health care; particular impact on oral health care trends will form major focus. Dental hygiene clinical practice is also included.

381. *Dental Hygiene Seminar and Practice 2*. II. 3 hr. PR: DTHY 380. Expanded services for the dental hygienist with emphasis on restorative and periodontal functions.

385. *Research Methods for the Dental Hygienist*. II. 3 hr. PR: ED P 311. Methods and techniques of research in dental hygiene. Major emphasis on planning and evaluating health programs, conducting oral health surveys, designing experiments and critically analyzing research results.

397. *Dental Hygiene Research*. I, II, S. 3-6 hr. PR: Consent. Research activities leading to a thesis of original dental hygiene research.

Dentistry (DENT)

391. *Special Topics: Microcomputers in Dentistry*. 2 hr. PR: Consent. Introduction to microcomputing with hands-on experiences in patient recordkeeping, accounting, insurance handling, and word processing.

Endodontics

M. Jerry Todd, D.D.S., Director

1067 Health Sciences North

Degree Offered: Master of Science

The School of Dentistry and its Division of Endodontics offer a program of advanced study and clinical training leading to the degree of Master of Science. The program requires a minimum of 24 months (two academic years and two summer sessions) of full-time residency in the School of Dentistry and is designed to qualify dentists for careers in endodontic clinical practice, teaching, and research.

Inquiries concerning this program should be directed to the Office of the Associate Dean for Academic and Postdoctoral Affairs. Applicants will be processed in the School of Dentistry. Applicants approved for admission to the program will be notified soon after December 1.

Admission Requirements

The program's admission requirements are as follows:

- Graduation from an accredited school of dentistry.
- Evidence of scholastic and clinical achievement that would indicate the applicant's ability to progress in a program of this nature.

Each applicant must file with the Department of Endodontics all information requested in the departmental application form by September 15.

Program Requirements

For the Master of Science degree, the following requirements must be met:

- Fulfillment of University requirements for graduate study.
- Twenty-four months (two academic years and two summer sessions) of consecutive residency at the WVU School of Dentistry.

- An approved master's thesis based on original research completed during the period of residency in an area related to endodontics.
- Successful completion of a final oral examination.
- Completion of a minimum of 63 credit hours, including 32 hours of endodontic courses, a minimum of 24 hours of selected basic sciences subjects, and a thesis (seven hours).
- Demonstration of satisfactory clinical competency in the student's field.
- Maintenance of a grade level commensurate with graduate education.

Dentistry (DENT)

400. *Advanced Oral Surgery*. I, II, S. 1-12 hr. PR: Consent. Advanced study of therapeutics, hospital protocol, and surgical aspects of oral surgery involving lectures, seminars, demonstrations, and clinical applications.

Endodontics (ENDO)

390. *Clinical Endodontics*. I, II, S. 1-5 hr. (May be repeated for credit.) PR: Graduate of an accredited dental school and admission to the Advanced Education Program in Endodontics or consent. Clinical endodontic practice in the areas of: ordinary endodontic cases, complex endodontic cases, hemisection, root amputation, replantation, transplantation, endodontic implantation, vital pulp therapy, apexification, and bleaching.

389. *Endodontic Theory*. I, II, S. 2 hr. PR: Consent. Provides seminar discussions in the topics of: basic endodontic techniques, advanced endodontic techniques, endodontic literature review, case presentation, and advanced endodontic theory.

490. *Endodontic Teaching*. S. 2 hr. PR: Consent. Selected teaching experiences including lecture, clinical, and laboratory teaching of undergraduate endodontic courses.

397. *Endodontic Research*. I, II, S. 2-3 hr. PR: Consent. Students will prepare a research protocol, conduct experimental research, and prepare a thesis of original endodontic research.

Microbiology (MBIM)

317. *Special Problems in Microbiology*. I, II, S. 1-7 hr. per sem. with a total of 24 hr. available. Pathogenic microorganisms, including immunology and antimicrobial agents.

Pathology (PATH)

382. *Oral Histopathology*. I, II. 1-2 hr. PR: PATH 338, 353, consent. Microscopic study of head and neck lesions.

401. *Special Studies in Oral Pathology*. I, II. 1-3 hr. PR: Consent. Advanced seminar or independent study of local and/or systemic disease processes affecting oral and facial structures.

Pharmacology and Toxicology (PCOL)

360. *Pharmacology*. I. 4 hr. PR: Dental student standing or consent. Lecture and demonstrations on pharmacologic actions and therapeutic uses of drugs.

Statistics (STAT)

311. *Statistical Methods 1*. I, II. 3 hr. PR: MATH 3. Statistical models, distributions, probability, random variables, tests of hypotheses, confidence intervals, regression, correlation, transformations, F- and Chi-square distributions, analysis of variance and multiple comparisons. (Also listed as ED P 311 and PSYC 311.)

Orthodontics

Peter Ngan, D.M.D., Chairperson

1077 Health Sciences North

Degree Offered: Master of Science

The School of Dentistry and its Department of Orthodontics offer a program of advanced study and clinical training leading to the degree of Master of Science. The program requires a minimum of 34 months (three academic years and two summers) of full-time residency in the School of Dentistry and is designed to qualify dentists for careers in orthodontic clinical practice, teaching, and research.

Inquiries concerning this program should be directed to the Office of the Associate Dean for Academic and Postdoctoral Affairs. Applications will be processed in the School of Dentistry. Those applicants approved for admission to the program will be notified soon after December 1.

Admission Requirements

- Graduation from an accredited dental school.
- Evidence of scholastic and clinical achievement that would indicate the applicant's ability to progress in a program of this nature. Generally, a minimum grade-point average of 3.0 is required for admission.
- Each applicant must file with the department all information requested in the department application form by September 15.
- Fulfillment of WVU general requirements for graduate study.
- Thirty-four months (three academic years and two summers) of consecutive residency at the School of Dentistry.
- An approved master's thesis based on original research completed during the period of residency in an area related to orthodontics.
- Satisfactory performance in a final oral examination.
- Completion of a minimum of 74 credit hours, including 46 hours of orthodontic courses, a minimum of 15 hours of selected basic sciences subjects, and a research/thesis (13 hours).
- Satisfactory demonstration of clinical competence in the student's field.
- Maintenance of a grade level commensurate with graduate education.

Anatomy (ANAT)

316. *Craniofacial Growth and Maturation*. II. 3 hr. PR: Consent of instructor. The current concepts of craniofacial growth and maturation are presented and integrated for application to clinical problems.

Orthodontics (ORTH)

397. *Research*. I, II, S. 1-15 hr.

416. *Biomechanics*. I, II, S. 2 hr. PR: Consent. Design and function of the teeth and their surrounding structures, and response of these tissues to orthodontic procedures.

417. *Orthodontic Technique*. I, II, S. 2 hr. PR: Consent. Laboratory course in techniques related to fabrication and manipulation of orthodontic appliances.

418. *Orthodontic Materials*. I, II, S. 1 hr. PR: Consent. Physical properties of materials used in orthodontic appliances.

419. *Orthodontic Diagnosis*. I, II, S. 1-3 hr. PR: Consent. Seminar-type class on technique of patient examination, acquiring diagnostic records, and analyzing and correlating this information to the treatment of clinical problems.

420. *Cephalometrics*. S. 1-3 hr. PR: Consent. Use of radiographic cephalometry in studying growth of the human face, analysis of dentofacial malformations, and evaluation of orthodontic treatment.

421. *Orthodontic Mechanics*. I, II, S. 1-4 hr. PR: ORTH 416, 417. Seminar and laboratory course on basic orthodontic mechanical properties.

422. *Advanced Orthodontic Mechanics*. I, II, S. 1 hr. PR: ORTH 421. Continuation of DENT 421 involving more difficult type cases and introducing more sophisticated appliance therapy.

423. *Growth and Development*. I, II, S. 1-5 hr. PR: Consent. Seminar-type course on normal and abnormal growth of the human head and its application to orthodontics.

425. *Orthodontic Seminar*. I, II, S. 1-8 hr. PR: Consent. Discussions involving all branches of dental science, with special emphasis on the orthodontic interest. Assigned topics and articles in the literature discussed.

426. *Orthodontic Clinic*. I, II, S. 1-12 hr. PR: ORTH 416, 417. Clinical treatment of selected patients.

Pathology (PATH)

397. *Pediatric Oral Pathology*. I. 2 hr. PR: Consent. Lecture and seminar course on inherited diseases and other pathologic situations of oral cavity and face specific for pediatric age group.

Statistics (STAT)

311. *Statistical Methods 1*. I, II. 3 hr. PR: MATH 3. Statistical models, distributions, probability, random variables, tests of hypotheses, confidence intervals, regression, correlation, transformations, F and Chi-square distributions, analysis of variance and multiple comparisons. (Equiv. to ED P 311 and PSYC 311.)

College of Engineering and Mineral Resources

Allen C. Cogley, Ph.D., Interim Associate Dean for Research and Graduate Studies

Afzel Noore, Ph.D., Associate Dean for Academic Affairs

Royce J. Watts, M.S., Associate Dean for Administration

e-mail: cemr-info@cemr.wvu.edu

web: <http://www.cemr.wvu.edu/>

Graduate Degrees Offered:

Aerospace Engineering	M.S.A.E., Ph.D.
Chemical Engineering	M.S.Ch.E., Ph.D.
Civil Engineering	M.S.C.E., Ph.D.
Electrical Engineering	M.S.E.E., Ph.D.
Engineering	M.S.E., Ph.D.
Engineering of Mines	M.S.E.M.
Industrial Engineering	M.S.I.E., Ph.D.
Mechanical Engineering	M.S.M.E., Ph.D.
Mineral Engineering	Ph.D.
Occupational Hygiene and Occupational Safety	M.S.
Petroleum and Natural Gas Engineering	M.S.P.N.G.E.
Safety and Environmental Management	M.S.

College of Engineering and Mineral Resources (CEMR) graduate programs are administered through the Departments of Chemical Engineering, Civil and Environmental Engineering, Electrical and Computer Engineering, Industrial and Management Systems Engineering, Mechanical and Aerospace Engineering, Mining Engineering, Petroleum and Natural Gas Engineering, and Safety and Environmental Management.

The facilities are housed on the Evansdale Campus in three buildings: the Engineering Sciences Building, the Mineral Resources Building, and the Engineering Research Building. These buildings house state-of-the-art research facilities, well-equipped teaching laboratories, classrooms, and offices for the faculty and administration of the graduate programs, the Mining Extension Service, and Industrial Extension Service.

The College offers a doctor of philosophy in most disciplines. The Ph.D. program prepares graduates for leadership in industrial, governmental, or academic engineering fields. The areas of specialization are aerospace, chemical, civil, computer, electrical, environmental, industrial managements systems, and mechanical engineering, and occupational hygiene and occupational safety. The Ph.D. in mineral engineering is also offered with specialization in mine systems, or rock mechanics and ground control.

Designated master's degrees are offered in aerospace, chemical, civil, and electrical engineering, engineering of mines, industrial engineering, mechanical engineering, and petroleum and natural gas engineering. A master of science in engineering degree is offered to qualified students whose baccalaureate work was in a field other than the engineering discipline being studied at the graduate level. Master of science (M.S.E.) degrees are offered in occupational hygiene and occupational safety and in safety and environmental management. A certificate in manufacturing systems engineering is offered for candidates working on M.S.E.E., M.S.I.E., and M.S.M.E. degrees.

A joint program with the Health Sciences Center offers a bioengineering option for M.S. and Ph.D. students in several departments.

For specific information about a program, students should contact the graduate program coordinator in the area of interest or the Associate Dean for Research and Graduate Studies at (304) 293-4821.

Special Requirements

A student desiring to take courses for graduate credit in the college must comply with the appropriate University regulations for graduate study. To become enrolled in a CEMR graduate program, a student must apply for admission through the Office of Admissions and Records to the major department of the student's choice. Acceptance by the major department will depend upon review of the student's academic background and available facilities in that department.

An applicant with a baccalaureate degree, or its equivalent, from a program accredited by the Accreditation Board for Engineering and Technology (ABET) or from an internationally recognized program in engineering will be admitted on the same basis as engineering graduates of WVU. Lacking these qualifications, an applicant must first fulfill any special requirements of the department in which the student is seeking an advanced degree.

No credits which are reported with a grade lower than C are acceptable toward an advanced degree. To qualify for an advanced degree, the graduate student must have a grade-point average of at least 3.0 based on all courses acceptable for graduate credit for which the student has received a grade from WVU. Graduate students in the College must also comply with the regulations of their major department.

Individual departments may establish more stringent requirements than those adopted for CEMR as a whole. These departmental requirements are contained in the individual program sections of the graduate catalog.

Course Load

A full-time graduate student must register for at least nine, but no more than 15, credit hours during each regular semester, or at least six, but no more than 12, credit hours in the two summer sessions combined. Permission to carry a heavier load must be obtained in writing from the dean.

Master's Program

For all master's degree students, an advisory and examining committee consisting of at least three faculty members will be appointed. A plan of study must be jointly prepared and approved by the student and all members of the student's advisory and examining committee, the department chair, and the dean or dean's designate, either at the end of the second semester of the student's attendance or at the completion of the twelfth course credit hour, whichever is later. The plan must contain a minimum of 30 semester credit hours, not more than nine of which can be at the 200 level. If a thesis or a problem report is part of the candidate's program, not more than six semester credit hours of research leading to an acceptable thesis or more than three semester credit hours of work for an acceptable problem report may be applied toward the credit hour requirement.

Application for Transfer of Graduate Credit A student wishing to apply graduate credit earned at another institution to a master's degree at WVU must complete an *Application for Transfer of Graduate Credit to WVU* form and have an official transcript submitted to the WVU Office of Admissions and Records from the external institution. A maximum of 12 semester hours from other institutions may be acceptable for credit at WVU in master's degree programs in engineering. Departmental programs may choose to accept fewer transfer credit hours.

Time to Completion All requirements for the master's degree must be completed within eight years preceding the student's graduation.

Doctor of Philosophy

The academic units within the College that are approved for participation in the doctor of philosophy degree program are the Departments of Chemical Engineering, Civil and Environmental Engineering, Electrical and Computer Engineering, Industrial and Management Systems Engineering, Mechanical and Aerospace Engineering, and Mining Engineering.

Admission as a graduate student is required of all applicants for admission to a program of study and research leading to the Ph.D. degree. Applicants for admission must hold or expect to receive a bachelor's degree in engineering from an accredited or an internationally recognized program in engineering. An applicant who holds a B.S. or M.S. in one of the physical sciences or mathematics may be considered for admission. Although a bachelor's degree is the minimum requirement, a master's degree in engineering is recommended for applicants. Admission to graduate study does not necessarily assure entrance into a CEMR doctoral program.

Application for Transfer of Graduate Credit A student wishing to apply credit earned at another institution to a doctoral degree program at WVU must submit the *Application For Transfer of Graduate Credit to WVU* form and have an official transcript from the institution forwarded to the WVU Office of Admissions and Records. The approval of transfer credit is at the discretion of the student's advisory and examining committee.

Advisory Committee The student, research advisor, academic advisor, and department chairperson appoint the student's advisory and examining committee. For the Ph.D. program, each committee must contain at least five members—at least three from the student's major department and at least two from other disciplines related to the student's area of interest.

Plan of Study At the end of the second semester of a student's attendance, at the completion of the twelfth credit hour, or when master's degree requirements are completed, whichever is later, the student, with the advice and consent of the student's academic advisor, research director, and members of the student's advisory and examining committee, will submit a plan of study, initiated in the student's department, to the dean or dean's designee. Some departments may require that a preliminary dissertation research proposal be submitted along with the plan of study.

Candidacy Examination After admission to the program and after the residence requirement is met, the applicant will take a candidacy examination in which the student must demonstrate: (a) a grasp of the important phases and problems of the field of study and an appreciation of their relation to other fields of human knowledge and accomplishments and (b) the ability to employ the instruments of research developed in the student's area of interest. When an applicant has passed the comprehensive examination, the student will be formally admitted to candidacy for the doctoral degree. A student will have only one opportunity for reexamination.

Credit Requirements The doctor of philosophy degree is not awarded solely on the basis of the accumulation of course credits and completion of a definite residence requirement. The amount and nature of the course work undertaken by a doctoral student will be established for each individual student with the objective of ensuring a reasonable and coherent progression of academic development beyond the baccalaureate and/or master's degree.

Residency Two semesters of full-time attendance at the Morgantown campus is required, consisting of a minimum of nine credit hours each. A summer schedule, consisting of registration in both sessions and completion of a minimum of nine hours, is considered equivalent to a one-semester residence.

Dissertation The candidate must submit a dissertation on a topic within the area of his/her major interest. The doctoral dissertation must represent the results of independent research, must show a high degree of originality and creativity on the part of the student, and must constitute an original contribution to the field of engineering science and/or design. The dissertation must have good literary form and style and must present a thorough review and survey of prior study and work in the area of research, with acceptable standards of documentation. It is anticipated that the work leading to the completion of the dissertation will require a minimum of 24 hours of research credits or satisfactory evidence of equivalent time devoted to research and preparation of the dissertation.

Time to Completion Requirements for this degree must be completed within five years after admission to candidacy.

Oral Examination Upon completion and approval of the dissertation and fulfillment of all other requirements, the candidate must pass a final oral examination conducted by his/her advisory and examining committee. The examination will be primarily a defense of the dissertation, although other questions necessary to determine the candidate's knowledge, critical ability, and reasoning power in the general field of study related to the research may be asked in order to establish the qualifications of the candidate for the degree.

Faculty

[†] Indicates regular membership in the graduate faculty.

^{*} Indicates associate membership in the graduate faculty.

Chemical Engineering

Professors

[†]Richard C. Bailie, Ph.D. (Iowa St. U.). *Emeritus*. Biomass pyrolysis, Fluidization, Thermal process.

[†]Eugene V. Cilento, Ph.D. (U. Cincinnati). Chairperson. Physiological transport phenomena, Biomedical engineering.

[†]Dady B. Dadyburjor, Ph.D. (U. Del.). Catalysis, Reaction engineering, Micellization, Solubilization. Alfred F. Galli, M.S. (WVU). *Emeritus*. Coal conversion, Process engineering, Biomass production.

[†]Rakesh K. Gupta, Ph.D. (U. Del.). Polymer processing, Rheology, Non-Newtonian fluid mechanics.

[†]Hisashi O. Kono, Dr. Engr. (Kyushu U.). Fluidization, Powder technology, Reaction engineering.

[†]Edwin L. Kugler, Ph.D. (Johns Hopkins U.). Heterogeneous catalysis, Adsorption, Reaction kinetics, Materials science: Zeolites, Ceramics, Hard metals.

[†]Alfred H. Stiller, Ph.D. (U. Cincinnati). Chemistry (physical inorganic chemistry), Solution chemistry, Coal liquefaction.

[†]Richard Turton, Ph.D., P.E. (Ore. St. U.). Fluidization, Gas-solid Systems, Transport phenomena, Heterogeneous chemical kinetics.

[†]Wallace B. Whiting, Ph.D., P.E. (U. Calif.-Berkeley). Thermodynamics, Fluid-phase equilibria, Chemical process design.

[†]Ray Y.K. Yang, Ph.D. (Princeton U.). Chemical reaction engineering, Biochemical engineering, Modeling and simulation.

[†]John W. Zondlo, Ph.D. (Carnegie Mellon U.). Heat transfer, Fluid mechanics, Coal processing.

Associate Professors

[†]Joseph A. Shaeiwitz, Ph.D. (Carnegie Mellon U.). Biochemical separations, Interfacial phenomena, Mass transfer.

Charter D. Stinespring, Ph.D. (WVU). Research. Materials, Surface reactions, Spectroscopy.

Assistant Professors

[†]Aubrey L. Miller, Ph.D. (Ill. Inst. Tech.). Multi-phase flow, Fluidization, Reaction engineering.

[†]Peter S. Stansberry, Ph.D. (Penn. St. U.). Research. Coal liquefaction, Carbonization, Carbons and graphite, Coal dissolution catalysis.

Civil and Environmental Engineering

Professors

[†]Sam A. Kiger, Ph.D., P.E. (U. Ill.). Chairperson. Structures, Structural dynamics, Protective construction, Earthquake engineering, Materials science, Soil/structure interaction.

Samuel G. Bonasso, P.E., M.S.C.E. (WVU). Adjunct. Cable transportation, Street engineering, Communication and creativity in engineering.

James G. Collin, Ph.D., P.E. (U. of Ca., Berkley). Adjunct. Geotechnical engineering Geosynthetics, Earth retaining structures, slope stabilization, Waste Containment.

[†]Echol E. Cook, Ph.D., P.E. (Okla. St. U.). George B. Berry Chair Professor, Environmental engineering, Biological treatment, Industrial waste treatment, Hazardous and solid waste management, Physical and chemical treatment process.

[†]Ronald W. Eck, Ph.D., P.E. (Clemson U.). Transportation engineering, Traffic, Highways.

James L. Green, P.E., M.S.C.E. (WVU). Adjunct. Environmental engineering, Water treatment, Water quality.

William J. Harman, P.E., M.S.C.E. (WVU). Adjunct. Construction methods, Construction specifications.

[†]W. Joseph Head, Ph.D. (Purdue U.). Waste utilization, Highway and airfield pavements, Concrete.

[†]Ganga Rao V. S. Hota, Ph.D., P.E. (N.C. St. U.). Director, Constructed Facilities Center.

Mathematical modeling of engineering systems, Bridge engineering, Prefabricated housing.

Charles R. Jenkins, Ph.D. (Okla. St. U.). *Emeritus*.

[†]Larry D. Luttrell, Ph.D., P.E. (Cornell U.). Analysis and design of structures: steel, composite slabs, metal buildings, Case studies of failures.

Michael McCawley, Ph.D. (NYU). Adjunct. Environmental engineering, Air pollution, Air quality.

[†]Lyle K. Moulton, Ph.D., P.E. (WVU). *Emeritus*.

[†]William A. Sack, Ph.D., P.E. (Mich. St. U.). Environmental engineering, Biological treatment, Bioremediation of hazardous wastes, Nutrient removal, Industrial waste Treatment and reclamation.

[†]H. Jayalath Siriwardane, Ph.D. (VPI & SU). Geotechnical engineering/geomechanics, Finite element method, Computer applications.

[†]Constantine C. Spyrakos, Ph.D. (U. Minn.). Dynamics of structures, Soil-structure interaction, Numerical methods of analysis (BEM, FEM).

Associate Professors

Dennis C. Chambers, P.E., M.S.C.E. (WVU). Adjunct. Geotechnical engineering, Construction and materials.

[†]H. L. Chen, Ph.D. (Northwestern U.). Structural dynamics, Structural experimentation, Dynamic soil-structure interaction, Damage in reinforced concrete structures.

[†]Julio F. Davalos, Ph.D. (VPI). Finite element analysis and modelling of structures, Spatial stability investigation, Materials characterization of engineered timber products.

[†]Darrell R. Dean, Jr., L.L.S., Ph.D. (Purdue U.). Land surveying, Mapping, Photo grammetry.

[†]Robert N. Eli, Ph.D., P.E. (U. Iowa). Hydrology, Hydraulics, Computer graphics.

[†]Mohammed A. Gabr, Ph.D., P.E. (N.C. St. U.). Geotechnical aspects of waste containment and remediation, Soil-structure interaction, Groundwater and seepage, and *In Situ* testing.

[†]Donald D. Gray, Ph.D., P.E. (Purdue U.). Fluid flow, Computational fluid mechanics.

David A. Pask, P.E., M.S., Eviron. (Tech. U. of Nova Scotia). Adjunct. Environmental engineering, Water treatment, Public health, Wastewater treatment.

[†]Brian E. Reed, Ph.D. (SUNY-Buffalo). Environmental engineering, Hazardous waste treatment, Groundwater remediation.

Robert W. Wheeler, M.S.C.E. (WVU). Adjunct. Environmental engineering, Public health, Water supply.

William D. Wyant, M.S.C.E. (WVU). Adjunct. Transportation engineering, Construction methods.

Assistant Professors

[†]Patrick E. Carriere, Ph.D., P.E. (N.C. State U.). Environmental engineering, Water resources, Computer-simulated stream flow models, Acid waste neutralization.

- [†]Udaya B. Halabe, Ph.D., P.E. (MIT). Nondestructive evaluation and in-situ condition Assessment of structures and materials, Wave propagation, Structural analysis and dynamics.
- Wei Lin, Ph.D. (SUNY-Buffalo). Research. Environmental engineering, Hazardous waste management, Wastewater treatment system design and modeling.
- Roberto Lopez-Anido, Ph.D. (WVU). Research. Modeling and experimental characterization of composite and hybrid material components and systems for civil structures; bridge engineering; timber bridges; numerical methods of structural analysis; applied mechanics.
- [†]David R. Martinelli, Ph.D. (U. Md.). Director, Harley O. Staggers National Transportation Center. Transportation engineering, Engineering economics, Systems analysis, Expert systems.

Computer Engineering

Professors

- [†]Powsiri Klinkhachorn, Ph.D. (WVU). Microprocessor applications, Computer architecture, Binary and nonbinary logic.
- [†]Roy S. Nutter, Jr., Ph.D., P.E. (WVU). Chairperson. Electric vehicles, Neural networks, Microprocessor systems, Computer architecture, Expert systems.
- Robert E. Swartwout, Ph.D. (U. Ill.). *Emeritus*.
- [†]Stuart K. Tewksbury, Ph.D. (U. Rochester). VLSI & ULSI digital electronics, Digital communications, Microprocessor systems.

Associate Professors

- [†]Hany H. Ammar, Ph.D. (U. Notre Dame). Modeling and evaluation of parallel and distributed systems, Performance and dependability.
- [†]Robert L. McConnell, Ph.D. (U. Ky.). Undergraduate coordinator, Electronic instrumentation, Power control, Microcomputer based applications, Engineering design.
- [†]Afel Noore, Ph.D. (WVU). Fault-tolerant computing, Design for testability, VLSI design and testing, Computer architecture, Distributed and parallel processing.

Electrical Engineering

Professors

- Walton W. Cannon, Ph.D. (U. Ill.). *Emeritus*.
- [†]Muhammad A. Choudhry, Ph.D. (Purdue U.). Graduate coordinator. Power system control, DC transmission, Stability, Power electronics.
- [†]Wils L. Cooley, Ph.D., P.E. (Carnegie Mellon U.). Biomedical engineering, Electronics, Design.
- [†]Ali Feliachi, Ph.D. (Ga. Tech.). Large-scale systems, Adaptive control, Power systems.
- Edwin C. Jones, M.S.E. (U. Ill.). *Emeritus*.
- [†]Ronald I. Klein, Ph.D. (U. Iowa). Automatic control, Estimation theory, System identification, Electric vehicles.
- [†]William C. Miller, Ph.D. (Stanford). Digital signal processing, Artificial neural networks, Ocean engineering, Active materials, TQM, Adaptive control.
- [†]Craig S. Sims, Ph.D. (SMU). Signal processing, Control systems, Estimation theory.
- Nelson Smith, Jr., D.Sc. (U. Pitt). *Emeritus*.

Associate Professors

- Everette C. Dubbe, B.S.E. (S. Dak. St. U.). *Emeritus*.
- [†]Lawrence Hornak, Ph.D. (Rutgers U.). Optics, VLSI, Electromagnetics.
- [†]Mark A. Jerabek, Ph.D., P.E. (Purdue U.). Acoustics, Ultrasonic tomography, Electromagnetics.

Assistant Professors

- [†]Biswajit Das, Ph.D. (Purdue U.). High speed electronic and photonic devices, Nanoscale device fabrication and testing, Electron beam lithography, Fabrication and cryogenic testing of quantum devices, Electro-optic and nonlinear optical materials and devices, Nano-optics.
- [†]Parviz Famouri, Ph.D. (U. Ky.). Analysis and control of electrical machines, Motor drives, Power electronics, Electric vehicles.

Industrial and Management Systems Engineering

Professors

- [†]Rashpal S. Ahluwalia, Ph.D., P.E. (Western Ontario U.). Computer integrated manufacturing, Flexible manufacturing, Robotics, Expert systems, Process control and modeling.

*Jack Byrd, Jr., Ph.D., P.E. (WVU). Operations research, Production systems, Entrepreneurial studies.

*Robert C. Creese, Ph.D., P.E. (Penn. St. U.). Manufacturing processes/systems, Foundry engineering, Cost engineering.

*Wafik H. Iskander, Ph.D., P.E. (Tex. Tech U.). Operations research, Simulation, Applied statistics.

*Majid Jaraiedi, Ph.D. (U. Mich.). Quality control and applied statistics, Information systems.

*L. Ted Moore, Ph.D. (Rice U.). Operations research, Linear programming, Production/operations management.

*Ralph W. Plummer, Ph.D., P.E. (WVU). Chairperson. Human factors, System safety Industrial hygiene.

*Terrence J. Stobbe, Ph.D. (U. Mich.). Ergonomics, System safety, Industrial hygiene.

Associate Professors

*Warren R. Myers, Ph.D. (WVU). Industrial hygiene, Ergonomics, Safety engineering.

*B. Gopalakrishnan, Ph.D. (VPI). Manufacturing engineering, Artificial intelligence, Concurrent engineering.

Assistant Professors

*Dianne McMullin, Ph.D. (Nebraska). Ergonomics, Safety engineer, Occupational safety.

Mechanical and Aerospace Engineering

Professors

*Richard A. Bajura, Ph.D., P.E. (U. N. Dame). Director of NRCCE. Fluids engineering.

*Reda Bata, Ph.D. (U. of Florida). Alternate fuels, Thermal sciences, Engine testing.

Edward F. Byars, Ph.D., P.E. (U. Ill.). *Emeritus*.

*Ismail Celik, Ph.D. (U. Iowa). Fluids engineering.

Keh-Minn Chang, Ph.D. (U. of Calif. Berkeley). Materials, Physical metallurgy.

*Nigel Clark, Ph.D. (U. Natel, So. Africa). Multiphase flows, I.C. engines.

*Allen C. Cogley, Ph.D. (Stanford U.) Dean. Aerodynamics, Fluid mechanics, Aerospace engineering.

*Russell K. Dean, Ph.D. (WVU). Associate Provost for Curriculum and Instruction. Engineering mechanics.

Robert M. Desmond, Ph.D., P.E. (U. Minn.). Heat transfer, Energy, Alternate energy sources.

Hasan T. Gencsoy, M.S.M.E. (WVU). *Emeritus*.

Russell R. Haynes, Ph.D., P.E. (WVU). Adjunct. Engineering design.

*Eric K. Johnson, Ph.D., P.E. (U. Wisc.). Heat transfer, Combustion, Thermodynamics, Gas-solid flows.

*John Kuhlman, Ph.D. (Case West. Res. U.). Fluid mechanics.

*Steve Lewellen, Ph.D. (UCLA). Research. Fluid dynamics.

Thomas R. Long, P.E., Ed.D. (WVU). Associate Dean. Engineering design.

*John L. Loth, Ph.D., P.E. (U. Toronto). Aerospace systems, Combustion.

*Donald W. Lyons, Ph.D., P.E. (Ga. Tech.). Chairperson. Manufacturing systems, Instrumentation, Engines and emissions.

*Kenneth H. Means, Ph.D., P.E. (WVU). Kinematics, Dynamics and stability, Friction and wear.

In-Meei Neou, Ph.D. (Stanford U.). *Emeritus*.

Nathan Ness, Ph.D. (Poly. Inst. NY). *Emeritus* and Visiting. Aerodynamics, Thermodynamics.

*G. Michael Palmer, Ph.D. (WVU). Instrumentation, Microprocessor applications.

Augustine A. Pitrolo, B.S.M.E. (WVU). Adjunct. Fossil energy.

Helen L. Plants, P.E., M.S.C.E. (WVU). *Emerita*.

Harold Schall, B.S. (C. W. Post Coll.). Adjunct. Quality function deployment.

Samir Shoukry, Ph.D. (U. Aston in Birmingham). Research. Structural dynamics, Neural nets, Instrumentation.

*Nithiam T. Sivaneri, Ph.D. (Stanford U.). Director of Graduate Education. Structural mechanics, Composite materials, Finite-element analysis.

Robert D. Slonneger, P.E., M.S.M.E. (U. Tex.). *Emeritus*.

*John E. Sneckenberger, Ph.D., P.E. (WVU). Mechanical design and automation.

William Squire, M.A. (U. Buffalo). *Emeritus*.

*Charles Stanley, Ph.D. (WVU). Pulmonary bioengineering, Mechanical instrumentation.

*Richard E. Walters, Ph.D. (WVU). Associate Chairperson. Aerospace engineering.

Donald T. Worrell, P.E., M.S.E. (WVU). *Emeritus*.

Associate Professors

Rodney Anderson, Ph.D. (U. Mo.-Rolla). Adjunct. Aerosol and particle science.

†Larry Banta, Ph.D. (Ga. Tech.). Robotics, Automation.

†Ever Barbero, Ph.D. (VPI). Structural Mechanics, Materials, Constructed facilities.

†Mridul Gautam, Ph.D. (WVU). Fluid mechanics.

†Alvin Howell, Ph.D. (WVU). Visiting. Structures, Materials.

†Bruce Kang, Ph.D. (U. Wash.). Experimental mechanics, Advanced materials.

†Margaret Lyell, Ph. D. (U. So. Calif.). Fluid mechanics.

†Gary Morris, Ph.D. (WVU). Associate Chairperson and Graduate Program Director. Fluid mechanics, Combustion.

†Victor Mucino, D.E. (U. Wisc.-Mil.). Engineering design.

†Timothy Norman, Ph.D. (Purdue). Advanced composite materials, Fracture mechanics, Experimental mechanics, Biomechanics.

John E. Notestein, M.S.M.E. (Purdue U.). Adjunct. Fossil energy.

†Jacky Prucz, Ph.D. (Ga. Tech.). Structural dynamics, Composite materials.

Jaiyoung Ruy, M.D. (Catholic Med. Coll. Korea). Adjunct. Bioengineering.

†James E. Smith, Ph.D. (WVU). Mechanical design.

Larry D. Strickland, Ph.D. (WVU). Adjunct. Fossil energy.

†Wallace S. Venable, P.E., Ed.D. (WVU). Engineering mechanics.

Assistant Professors

†Chris Atkinson, Sc.D. (MIT). Fluid Mechanics, Instrumentation, Engine emissions.

†Randy Churchill, Ph.D. (WVU). Research. Thermodynamics, Heat transfer, IC engines, Alternate fuels.

John R. Etherton, M.S. (Geo. Wash. U.). Adjunct. Mechanical system safety.

†David Lewellen, Ph.D. (Cornell). Research. Fluid Dynamic Turbulence.

Hwei-Min Lu, Ph.D. (WVU). Research. Thermodynamics, Machine design.

†Marcello Napolitano, Ph.D. (Okla. St. U.) Aircraft stability and control, Feedback control, Dynamics.

Greg Thompson, Ph.D. (WVU). Research. Thermodynamics, Machine design.

†Wenguang Wang, Ph.D. (WVU). Research. Mechanical design, Engines and emissions.

Lane Wilson, Ph.D. (Stanford). Research surface science, Scanning probe microscopy, Nano and micro structure of materials.

Mining Engineering

Professors

†Eung Ha Cho, Ph.D. (U. Utah). Chairman. Mineral processing, Hydrometallurgy.

R. Larry Grayson, Ph.D., P.E. (WVU). Mine management, Health and safety.

Jay H. Kelley, Ph.D. (Penn. St. U.). Distinguished. *Emeritus*.

†A. Wahab Khair, Ph.D. (Penn. St. U.). Rock mechanics, Ground control.

†Syd S. Peng, Ph.D. (Stanford U.). Charles T. Hollard Distinguished Professor of Mining Engineering and Chairman. Longwall mining, Ground control.

†Y.J. Want, Ph.D., P.E. (Penn. St. U.). Mine ventilation, Computer application, Mine design

†David C. Yang, Ph.D. (U.C.-Berkeley). Research. Coal/mineral processing.

Associate Professors

Donald M. Bondurant, M.S.E.M. (WVU). *Emeritus*

Joseph D. McClung, M.S.E.M. (U. Pitt.). *Emeritus*

†S. Daniel Thompson, Ph.D. (WVU). Mining systems, Mining equipment, Computer application.

Assistant Professor

†Felicia F. Peng, Ph.D. (WVU). Coal preparation, Coal utilization, Process control, Plant design.

Particle Analysis Center

†Thomas P. Meloy, Ph.D. (MIT). Benedum Professor. Powder science, Mineral liberation, Plant circuit analysis.

Petroleum and Natural Gas Engineering

Professors

†Samuel Ameri, P.E., M.S.Pet.E. (WVU). Chairman. Formation evaluation.

*Khashayar Aminian, Ph.D. (U. Mich.). Natural gas engineering, Reservoir simulation.
 Robert W. Chase, Ph.D. (Penn. St. U.). Adjunct. Natural gas engineering.
 *Thomas P. Meloy, Ph.D. (MIT). Petroleum engineering fundamental.
 *James A. Wasson, P.E., M.S.P.N.G. (Penn. St. U.). Reservoir engineering, Enhanced oil recovery.
 Larry Woodford, A.M. (Ind. U.). Adjunct.

Assistant Professors

*H. Ilkin Bilgesu, Ph.D., P.E. (Penn. St. U.). Drilling engineering.
 *Shahab Mohaghegh, Ph.D. (Penn. St. U.). Reservoir engineering.

Safety and Environmental Management

Professors

*Daniel E. Della-Giustina, Ph.D. (Mich. St. U.). Chairperson. Safety management services, Sport safety, Transportation safety, Emergency response.

Associate Professors

*Andrew Sorine, Ed.D. (WVU). Safety studies/management education.
 *Gary Winn, Ph.D. (Ohio St. U.). Safety studies, Transportation safety.

Assistant Professors

David L. Durham, M.S. (WVU). Research. Environmental management.
 *Linda Frederick, Ph.D. (U. of Mich.). Occupational hazards, Workplace evaluation, Human factors, Ergonomics.
 *Michael J. Klishis, Ph.D. (WVU). Miner training, Curriculum development.
 David Whaley, Ph.D. (St. U. of NY at Buffalo). Environmental sciences and management, Industrial hygiene.

Industrial Extension Service

Robert G. Lehman, B.I.E. (GMI). Director. Manufacturing management, Quality, Cost, Energy and production control systems.

Extension Engineers

Thomas A. Bailey, P.E., B.I.E. (Ohio St.). Energy management, Environmental assessments, Statistical process control training.
 Thomas R. Bodnar, P.E., B.S.M.E. (U. Pitt). Process flow analysis, Product testing, Plant layout.
 Lawrence D. Dixon, P.E., B.S.E.E. (W.V.I.T.). Energy management, Control systems design.
 Raymond D. Neupert, P.E., B.S.I.E. (WVU). Quality systems assessment, Process flow analysis, Statistical process control training.

Technology Transfer Associates

Joseph A. Murray, B.S.E.E. (WVU). Projectile propulsion systems, Testing methods, Project management.

Mining Extension Service

Professor

Joseph C. Dorton, B.S. (Concord C.). Mine foreman training, Electrical training, Mandatory miner training courses.

Associate Professors

Robert L. Halstead, B.S. (Morris Harvey College). Mine foreman training, Electrical training, Production technology.
 Thomas L. Savage, B.S. (Cornell U.). *Emeritus*. Hydraulics.

Assistant Professors

*Cynthia M. Bindocci, Ed.D. (WVU). Training material development, Women in coal industry, Historical research of mining tools.
 Luther B. Ferguson. *Emeritus*.
 James H. Kincaid, B.S. (WV Tech). Mine foreman training, Surveying, Mine ventilation.

Mining Extension Agents

James M. Dean, M.S.E.M. (WVU). Acting associate director, Mine management, Mine safety and health, Mandatory miner training courses.
 Thomas W. Hall, B.S. (Fairmont St. Coll.). Mine foreman training, Mandatory miner training courses, Mining methods.

William E. Moser, B.S. (Robert Morris Coll.). Mine rescue/safety.
Joseph E. Spiker, M.S. (WVU). Mine rescue/safety.
Ireland Sutton, B.S. (WV Inst. of Tech.). Electrical training, Contractor training.

Mine Emergency Preparedness Center

William E. Moser, B.S. (Robert Morris Coll.). Director. Mine rescue/safety.
Joseph E. Spiker, M.S. (WVU). Mine rescue/safety.

COMER Museum

Cynthia M. Bindocci, Ed.D. (WVU). Director.

Chemical Engineering

Eugene V. Cilento, Ph.D., Chairperson

403 Engineering Sciences Building

e-mail: che-info@cemr.wvu.edu

web: <http://www.cemr.wvu.edu/~wwwche/>

Degrees Offered:

Master of Science in Chemical Engineering

Master of Science in Engineering with a major in Chemical Engineering

Doctor of Philosophy with a major in Chemical Engineering

The Department of Chemical Engineering, with 12 faculty members, 150 undergraduates, and over 40 graduate students, has one of the oldest doctoral-granting programs in the University. From the initial doctoral degree in 1932, the graduate course program has been based on advanced chemical engineering fundamentals, while the research program has reflected a balance of fundamental research areas and their application to relevant technological areas such as bioengineering, catalysis, coal conversion, materials, and polymer processing.

Faculty Research Areas

Chemical engineering faculty are presently involved in the following research areas: biochemical engineering, bioengineering, catalysis, fluid mechanics, heat transfer, materials engineering, polymers, reaction engineering, separation processes, solution chemistry, surface science, and thermodynamics. These fundamental areas are finding applications in biomass conversion technology, biotransport, coal gasification and liquefaction, materials handling and processing, *in-situ* combustion, non-fuel uses of coal, carbon products and science, and synthetic fuels.

Faculty members possess a wide variety of industrial experience and are routinely in contact with their counterparts in industry. This contact with real engineering problems enables them to convey a practical experience to students while keeping in perspective many of the fundamental concepts involved in graduate study. During the last five years, the chemical engineering faculty have authored or coauthored 5 books, published over 190 journal articles, have been issued 14 patents, made over 220 presentations at professional meetings, and supervised the completion of 19 master's and 14 doctoral degrees. In addition, several faculty members have taught short courses throughout the United States and abroad.

Degree Programs

The department is authorized to admit students to the following degree programs: master of science in chemical engineering (M.S.Ch.E.), master of science in engineering

(M.S.E.), and College of Engineering and Mineral Resources interdisciplinary doctor of philosophy (Ph.D.). Students in these programs must comply with the rules and regulations as presented in the general requirements for graduate work in the College of Engineering and Mineral Resources and in the Department of Chemical Engineering. Students interested in pursuing work for a master's or doctoral degree in chemical engineering should contact the department for copies of the required guidelines and application information.

Admission

Admission to the M.S.Ch.E. program is restricted to those holding a baccalaureate degree in chemical engineering or its equivalent. The M.S.E. program is available to students holding baccalaureate degrees in other fields of engineering and the physical sciences who wish to pursue a broad interdisciplinary program relevant to the major graduate areas administered by the department. To be admitted as a regular graduate student, an applicant must have a B.S. degree and a sound record in previous college work with a minimum 3.0/4.0 cumulative grade-point average. Applicants who cannot meet these conditions may be considered for admission in a conditional category. Students admitted with deficiencies in their undergraduate programs are required to take some chemical engineering courses as prerequisites for graduate courses. These requirements are stated as a condition for admission.

Planned Programs

M.S.Ch.E. candidates should expect to obtain their degree in about 18 months. M.S.E. students typically require 1 to 1 1/2 years beyond completion of prerequisite courses. Typically, the prerequisite courses include as a minimum: Ch E 110, 111, 112, 142, 145, and 172. All M.S. degree candidates are required to perform research and will follow a planned program which conforms to either of the following outlines:

- A minimum of 30 semester credit hours, excluding seminar, not more than six of which are in research leading to an acceptable thesis.
- A minimum of 33 semester credit hours, excluding seminar, not more than three of which are in research leading to an acceptable problem report.

The course work M.S. degree option is not offered by the Department of Chemical Engineering.

Required Courses

All students are required to take Ch E 301, 344, and 345, and all full-time students are required to take one credit of journal club/seminar (Ch E 400) for each semester enrolled. The research advisor, in conjunction with an advisory and examining committee (AEC) to be designated by each student, will be responsible for following departmental guidelines to determine the plan of study appropriate to the student's program.

A written research proposal and oral presentation of this proposal is required of all M.S. students. This oral defense is administered by the student's AEC and must be completed by the end of the second semester of the first year for M.S.Ch.E. candidates, and as soon as possible but not later than the end of the second semester of the second year for M.S.E. candidates.

Final Examination

All students are required to pass a final oral examination, administered by their AEC, covering both the thesis or problem report (depending on the program selected) and related course material.

Doctor of Philosophy

A candidate for the degree of doctor of philosophy must comply with the rules and regulations as outlined in the general requirements for graduate work in engineering and the specific requirements stated in the departmental guidelines. Students who are interested in pursuing a Ph.D. degree in the Department of Chemical Engineering should contact the department for specific information about the interdisciplinary Ph.D. degree program. A program with a major in chemical engineering, designed to meet the needs and objectives of each student, will be developed in consultation with the student's research advisor and advisory and examining committee (AEC). It should be emphasized that the Ph.D. degree is primarily a research degree, and therefore the research work for a doctoral dissertation should show a high order of originality on the part of the student and must offer an original contribution to the field of engineering science.

Admission Admission to the Ph.D. program is open to students who qualify as regular graduate students and who have obtained a B.S. or M.S. degree in science or engineering. Students admitted must have demonstrated an excellent academic record in previously completed college course work with a minimum cumulative grade-point average of 3.0/4.0. Three letters of recommendation are required, and GRE scores are required by the department. Students in the Ph.D. program should complete the requirements in two to four years.

Required Courses All B.S. students entering the Ph.D. program are required to take Ch E 301, 344, and 345, while M.S. students entering the program must demonstrate equivalent courses taken for graduate credit. In addition, all full-time students must take one credit of seminar/journal club (Ch E 400) each semester. For a student admitted directly after the B.S. degree, the Ph.D. program consists of a minimum of 36 course credit hours, excluding research (Ch E 497) and seminar/journal club (Ch E 400). If the student has an M.S. in chemical engineering from WVU, the program consists of a minimum of 12 course credit hours (excluding Ch E 497 and Ch E 400). If the student has an M.S. in chemical engineering from another institution, the program consists of a minimum of 18 course credit hours (excluding Ch E 497 and Ch E 400). Students must complete a minor, consisting of a minimum of nine semester hours of a coherent set of courses taken outside the department. These courses may be related to the major research area. Nontechnical courses are considered only under exceptional circumstances. Courses at the 200 level may be acceptable. All courses must be approved by the AEC and the academic advisor. Students must complete graduate courses with an overall course work average of 3.0 or better (exclusive of research credits) and complete all Ch E courses with an overall grade-point average of 3.0 (exclusive of research credits). A minimum of 24 credit hours in dissertation research is required. Also, two semesters of full-time attendance at the Morgantown campus is required to complete the residency requirement.

Examinations All students must pass the Ph.D. qualifying examination given in their first year at WVU. This examination is designed to assess the basic competency of students in the chemical engineering field to determine whether or not they have sufficient knowledge to undertake independent research.

Within six months of passing the qualifying examination or of entering the Ph.D. program, whichever is later, the student must successfully defend an original research proposition in an oral examination. The written proposition, developed by the student alone, remains the intellectual property of the student and must be on a topic unrelated to the student's own research work for the dissertation.

Research Proposal A student must receive acceptance of a written dissertation research proposal and must also successfully defend this proposal to the student's AEC. This requirement must be completed within six months of passing the qualifying examination or of entering the Ph.D. program, whichever is later. The research work for the doctoral dissertation should show a high order of originality on the part of the student and must offer an original contribution to the field of engineering science.

A student who has successfully completed all course work, passed the qualifying examination, and successfully defended the original research proposition and research proposal is defined as one who is a candidate for the Ph.D. degree.

In order to complete the Ph.D. requirements, a student must pass a final oral examination on the results embodied in the dissertation. This examination is open to the public, and in order to evaluate critically the student's competency, may include testing on material in related fields, as deemed necessary by the AEC. In addition, since the Ph.D. degree is primarily a research degree that embodies the results of an original research proposal and represents a significant contribution to scientific literature, the student must submit a manuscript on this research to the AEC.

Chemical Engineering (CH E)

212. *Biochemical Separations*. 3 hr. PR: CH E 112 or consent. Modeling and design of separation processes applicable to recovery of biological products. Topics include filtration, centrifugation, extraction, adsorption, chromatography, electrophoresis, membranes, crystallization, examples from industry. 3 hr. lec.

224. *Coal Conversion Engineering*. 3 hr. PR: CHEM 134; Coreq: CH E 112, 172. Coal conversion processes from the unit operations approach; thermodynamics, kinetics, and evaluation of system requirements and performance. 3 hr. lec.

258. *Polymer Sci and Engrg*. 3 hr. PR: CHEM 134. Coreq: CH E 145. Polymer classification, Polymer synthesis, molecular weights and experimental techniques, thermodynamics, rubber elasticity, mechanical behavior, crystallization, diffusion, rheology, extrusion and injection molding. 3 hr. lec.

260. *Chemical Process Safety*. 3 hr. PR: CH E 41 or consent. Introduction to safety, health and loss prevention in chemical process industry; regulations, toxicology, hazard identification, system safety analysis and safety design techniques. 3 hr. lec.

265. *Interfacial Phenomena*. 3 hr. PR: CH E 145, CHEM 246 or consent. Processes occurring at fluid/fluid and fluid/solid interfaces. Interfacial tension, contact angle, wetting, transport phenomena near interfaces, properties and stability of colloids, colloid transport phenomena, surfactants, micelles and emulsions. 3 hr. lec.

272. *Biochemical Engineering*. 3 hr. PR: CH E 172 or consent. Kinetics of enzymatic and microbial reactions, interactions between biochemical reactions and transport phenomena, analysis and design of bioreactors, enzyme technology, cell cultures, bioprocess engineering. 3 hr. lec.

280. *Chemical Engineering Problems*. 1-6 hr. For juniors, seniors, and graduate students. For students desiring to take only a portion of a course, for individual projects, for subjects not covered in other courses.

301. *Transport Phenomena*. 3 hr. PR: Consent. Introduction to equations of change (heat, mass and momentum transfer) with a differential balance approach. Use in Newtonian

flow, turbulent flow, mass and energy transfer, radiation, convection. Estimation of transport coefficients. 3 hr. lec.

330. *Process Dynamics and Control*. 3 hr. PR: Consent. Dynamic response of processes and control instruments. Use of Laplace transforms and frequency response methods in analysis of control systems. Application of control systems in chemical reactors, distillation, and heat transfer operations. Introduction to nonlinear systems. 3 hr. lec.

331. *Mathematical Methods in Chemical Engineering*. 3 hr. PR: MATH 18 and consent. Classification and solution of mathematical problems important in chemical engineering. Treatment and interpretation of engineering data. Analytical methods for ordinary and partial differential equations including orthogonal functions and integral transforms. Vector calculus. 3 hr. lec.

338. *Advanced Numerical Methods*. 3 hr. PR: CH E 38 or consent. Methods for nonlinear algebraic equations, methods for initial and boundary value ordinary differential equations, methods for parabolic, hyperbolic, and elliptic partial differential equations, numerical stability and methods for stiff equations, optimization techniques. 3 hr. lec.

344. *Thermodynamics*. 3 hr. PR: Consent. Logical development of thermodynamic principles. These are applied to selected topics including development and application of the phase rule, physical and chemical equilibria in complex systems, and nonideal solutions. Introduction to nonequilibrium thermodynamics. 3 hr. lec.

345. *Chemical Reaction Engineering*. 3 hr. PR: Consent. Homogeneous and heterogeneous reaction systems, batch and flow ideal reactors, macro-and micro-mixing, non-ideal flow and nonideal reactors, diffusion and reaction in porous catalysts, reactor stability analysis, special topics. 3 hr. lec.

351. *Fluidization Engineering*. 3 hr. PR: Consent. Fundamentals of fluidization, two-phase flow theory and powder characteristics, structure and property of the emulsion phase and bubbles, mass- and heat-transfer in fluidized beds with and without chemical reaction. 3 hr. lec.

352. *Powder Technology*. 3 hr. PR: Consent. Characterization of powders, structure of powders, powders in two phase flow, measurement techniques, static and dynamic behavior of powders, grinding and agglomeration, chemistry of powders. 3 hr. lec.

391. *Advanced Topics*. 3 hr. PR: Consent. Investigation of topics not covered in regularly scheduled courses.

400. *Chemical Engineering Seminar*. 1 hr. Seminars on current research by visitors and graduate students.

402. *Advanced Fluid Dynamics*. 3 hr. PR: Consent. Analysis of flow of fluids and transport of momentum and mechanical energy. Differential equations of fluid flow; potential flow, laminar boundary layer theory, and non-Newtonian fluids. 3 hr. lec.

404. *Advanced Heat Transfer*. 3 hr. PR: Consent. Theory of transport of thermal energy in solids and fluids as well as radiative transfer. Steady and transient conduction; heat transfer to flowing fluids; evaporation; boiling and condensation; packed and fluid bed heat transfer. 3 hr. lec.

406. *Advanced Mass Transfer*. 3 hr. PR: Consent. Theory of diffusion, interphase mass transfer theory, turbulent transport, simultaneous mass and heat transfer, mass transfer with chemical reaction, high mass transfer rates, multicomponent macroscopic balances. 3 hr. lec.

432. *Optimization of Chemical Engineering Systems*. 3 hr. PR: Consent. Optimization in engineering design, unconstrained optimization and differential calculus equality constraints optimization, search technique, maximum principles, geometric and dynamic programming, linear and nonlinear programming, calculus of variations. 3 hr. lec.

444. *Applied Statistical and Molecular Thermodynamics*. 3 hr. PR: CH E 344 and consent. The connection between macroscopic phenomena (thermodynamics) and microscopic phenomena (statistical and quantum mechanics). Thermodynamics modeling for process analysis. Equations of state, perturbation theories, mixing rules, computer simulation, group contribution models, physical property prediction. 3 hr. lec.

446. *Catalysis*. 3 hr. PR: CH E 345 or consent. Physical and chemical properties of catalytic solids, nature and theories of absorption, thermodynamics of catalysis, theories of mass and energy transport, theoretical and experimental reaction rates, reactor design and optimization. 3 hr. lec.

447. *Non-Catalytic Solid-Fluid Reactions*. 3 hr. PR: CH E 345 or consent. Reaction models, pseudo-steady approximation, effectiveness factor, transport and chemical reaction properties, geometric, thermal and transitional instabilities, simultaneous multiple reactions, selectivities in fixed, moving and fluidized bed reactor design. 3 hr. lec.

480. *Advanced Independent Study*. 1-6 hr. PR: Consent. Designed to increase the depth of study in a specialized area of chemical engineering.

491. *Special Topics*. 3 hr. PR: Consent. Investigation of advanced topics not covered in regularly-scheduled courses.

497. *Research*. 1-15 hr.

Civil and Environmental Engineering

Sam A. Kiger, Ph.D., P.E., Chairperson

623 Engineering Sciences Building

e-mail: cee-info@cemr.wvu.edu

web: <http://www.cemr.wvu.edu/~wwwce/>

Degrees Offered:

Master of Science in Civil Engineering

Master of Science in Engineering with a major in Civil Engineering

Doctor of Philosophy with a major in Civil Engineering

The Department of Civil and Environmental Engineering offers the master of science in civil engineering (M.S.C.E.). In conjunction with the College of Engineering and Mineral Resources, the master of science in engineering (M.S.E.), and the doctor of philosophy degrees are available with emphases in civil engineering.

The Department of Civil and Environmental Engineering has a full-time faculty of 19, who are active in teaching, research, and professional commitments.

Areas of Emphasis

There are four major areas of interest of the faculty and graduate studies:

- Environmental engineering and water resources, which include occupational health, solid-hazardous waste management and site remediation, water supply and pollution, groundwater hydraulics, and hydrology.
- Geotechnical, environmental geotechnology, and materials engineering, which covers soil mechanics, foundations engineering, soil-structure interaction, groundwater and seepage, geosynthetics, contaminant transport, landfill design, and earthwork design, as well as construction materials and waste product utilization.
- Transportation engineering, which includes transportation systems principles, design and planning, and expert systems.
- Structural engineering, which involves work and study in advanced structural analysis, bridge engineering, building design, construction materials, and composite construction materials.

Faculty

With few exceptions, the members of the faculty are licensed professional engineers registered in one or more states and are involved in state, regional, and national professional organizations, serving on numerous technical committees. They are successful researchers and have published extensively in technical journals. The civil engineering faculty produces graduates who can assume the problem solving, decision making, and technical leadership roles of a professional engineer and who have the sound educational background for the continuing professional development the field requests.

Students tailor their program of study to satisfy their own special interests, with guidance from a faculty advisor. Opportunities abound within the master's and doctoral tracks for a research experience which provides a chance for a student to tackle an engineering problem individually, with guidance from a faculty advisor. The graduate program in civil engineering was established with the aim of developing its students' abilities to use today's contemporary methods of engineering analysis and design to solve tomorrow's engineering problems.

Application

An application package can be obtained from the Graduate Program Director, Department of Civil and Environmental Engineering, West Virginia University, P.O. Box 6103, Morgantown, WV 26506-6103.

Admission

To be eligible for admission into the M.S.C.E. degree program, a candidate must hold or expect to receive a B.S.C.E. degree from either an accredited ABET curriculum or an internationally recognized program. Candidates with superior academic records and a baccalaureate degree in another engineering field, mathematics, or science may be eligible for admission into any of the masters programs offered by the department but will normally be required to attain a baccalaureate level of proficiency in certain engineering areas of the department. **An engineering technology (non-calculus based) degree is not sufficient qualification for admission into any of the graduate programs offered by the department.**

To be eligible for admission into the Ph.D. degree program, a candidate must hold or expect to receive an M.S. degree in some discipline of engineering from an institution which has an ABET accredited undergraduate program in engineering or an internationally recognized program in engineering.

The other requirements for admission into the graduate programs of the department are summarized as follows:

- To be admitted as a regular graduate student, an applicant must have a grade-point average of 3.0 or better (out of a possible 4.0) in **all** previous college work and must meet all other requirements below.

- The applicant must first submit, to the Office of Admissions and Records of West Virginia University, a completed application, application fee, and transcripts of all college work completed (directly from the institution).

- Each applicant is required to have three reference letters (using standard forms available from the department) sent directly to the department; at least two of the three references should be from the institution the applicant last attended.

- A minimum score of 550 on the TOEFL is required of all applicants from countries where the native language is not English. (Students who have completed a recent four year bachelor's degree in the USA need not submit these scores.)

- All applicants who have not received their undergraduate degree in the United States are required to submit GRE General Test scores with the Engineering Subject Test score being optional.

Provisional Admission An applicant who is not qualified for regular graduate student admission status, due either to insufficient grade-point average, incomplete credentials, or inadequate academic background, can be admitted as a provisional student. Requirements for attaining regular student status must be stated in the letter of admission. Provisional students must sign a contract, which lists these requirements in detail, no later than their first registration.

Program Outlines Students must comply with rules and regulations as outlined in the general requirements for graduate work. Each candidate will, with the approval and at the discretion of the graduate committee, follow a planned program which must conform to one of the following outlines:

- A minimum of 30 semester credit hours, not more than six of which are in research leading to an acceptable thesis.

- A minimum of 33 semester credit hours, not more than three of which are in research leading to an acceptable problem report.

- A minimum of 36 semester credit hours, with no thesis or problem report required.

No rigid curricula are prescribed for the degrees of master of science in civil engineering and master of science in engineering. Graduate-level work in mathematics, mechanics, or other appropriate areas of science is customary; however, at least 15 semester hours of credit should normally be selected from graduate civil engineering courses.

Thesis A thesis or problem is normally required of all candidates. While required credit in research (C E 497) is devoted to the thesis or report preparation, the thesis or problem report is not automatically approved after the required number of semester hours of research work have been completed. The thesis or problem report must conform with the general WVU requirements for graduate study and with any additional requirements established by the department.

Examinations A candidate shall be required to pass an examination which may be written or oral or both, to be administered by the student's advisory and examining committee. The examination shall cover course material and the thesis or problem report, depending upon the program followed.

Approval for the M.S.C.E. degree is restricted to those holding a baccalaureate degree in civil engineering.

Master of Science in Engineering

The master of science in engineering program is available to students approved for the graduate program who possess a baccalaureate degree in a technical area other than civil engineering. Students entering this graduate program must complete appropriate undergraduate work as specified by departmental regulations. This degree program is administered by the College of Engineering and Mineral Resources; the program may emphasize civil engineering.

Doctor of Philosophy

The doctor of philosophy degree is administered through the College's interdisciplinary program; civil engineering may be the major. A candidate for the degree of doctor of philosophy must comply with the rules and regulations outlined in the general requirements of the College of Engineering and Mineral Resources. The research work for the doctoral dissertation must show a high degree of originality on the part of the student and must constitute an original contribution to the art and science of civil engineering.

Civil Engineering (C E)

201. *Principles of Boundary Surveying*. 3 hr. PR: C E 105 or consent. A study of the retracement requirements for metes and bounds survey systems. The study will include interpretation and writing of the property descriptions, legal principles related to boundary establishment, and analytical approaches to boundary location. 3 hr. rec.

212. *Concrete and Aggregates*. 3 hr. PR: C E 110 or consent. Considerations and methods for the design of concrete mixes. Properties of portland cement and aggregates and their influence on the design and performance of concrete mixtures. Testing of concrete and aggregate and the significance of these tests. 2 hr. lec., 3 hr. lab.

213. *Construction Methods*. 3 hr. PR: Junior or senior standing in civil engineering. Study of construction methods, equipment, and administration with particular emphasis on the influence of new developments in technology. 3 hr. rec.

220. *Computational Fluid Mechanics*. 3 hr. PR: C E 121, E. 2 or consent. Use of the computer in elementary hydraulics, open channel flow, potential flow, and boundary layer flow, numerical techniques for solution of algebraic equations, ordinary differential equations, and partial differential equations. 3 hr. rec.

225. *Engineering Hydrology*. II. 3 hr. PR: CE 121 or consent. Scientific basis of the hydrologic cycle and its engineering implications; rainfall-runoff process, hydrographs, flood routing, and statistical methods. 3 hr. lec.

227. *Water Resources Engineering*. II. 3 hr. PR: CE 225. Application of hydrologic and hydraulic principles in the design and analysis of water resource systems; probability concepts and economics in water resource planning, water law, reservoir operations, hydraulic structures, flood-damage mitigation, hydroelectric power, and drainage. 3 hr. lec.

231. *Highway Engineering*. 3 hr. PR: CE 132, 181. Highway administration, economics and finance; planning and design; subgrade soils and drainage; construction and maintenance. Design of a highway. Center-line and grade-line projections, earthwork and cost estimate. 2 hr. lec., 3 hr. lab.

233. *Urban Transportation Planning and Design*. 3 hr. PR: CE 132 or consent. Principles of planning and physical design of transportation systems for different parts of the urban area. Land use, social, economic, and environmental compatibilities are emphasized. Evaluation and impact assessment.

235. *Railway Engineering*. 3 hr. PR: CE 105. Development and importance of the railroad industry. Location, construction, operation, and maintenance. 3 hr. rec.

243. *Environmental Science and Technology*. I. 3 hr. PR: Engineering major. Issues of global atmospheric changes, minimization and control of hazardous wastes, groundwater contamination, water pollution, air pollution, solid waste control, and management of water and energy resources. 3 hr. lec.

245. *Properties of Air Pollutants*. 3 hr. PR: Consent. Physical, chemical, and biological behavioral properties of dusts, droplets, and gases in the atmosphere. Air pollutant sampling and analysis. Planning and operating air pollution surveys. 2 hr. lec., 3 hr. lab.

247. *Environmental Engineering Design*. I. 3 hr. PR: CE 122. Process design of treatment/remediation systems; comparison of alternatives and preliminary cost evaluation. 2 hr. lec., 3 hr. lab.

251. *Public Health Engineering*. 3 hr. PR: Consent. Engineering aspects involved in control of the environment for protection of health and promotion of comfort of humans. Communicable disease control, milk and food sanitation, air pollution, refuse disposal, industrial hygiene, and radiological health hazards. 3 hr. rec.

252. *Water Resources Engineering*. 3 hr. PR: CE 122. Application of hydrologic and hydraulic principles in the design and analysis of water resources systems. Topics include hydraulic structures, economics and water law irrigation, hydroelectric power, navigation, flood-drainage litigation, and water-resources planning. 3 hr. rec.

261. *Structural Analysis 2*. I, II. 3 hr. PR: CE 161 or consent. Fundamental theory of statically indeterminate structures; analysis of indeterminate beams, frames, and trusses by stiffness and flexibility methods; study of influence lines for beams, frames, and trusses. 3 hr. lec.

270. *Reinforced Concrete Design*. 3 hr. PR: CE 110, 161; PR or Conc.: CE 261. Behavior and design of reinforced concrete members. Material properties; design methods and

safety considerations; flexure; shear; bond and anchorage; combined flexure and axial load; footings; introduction to torsion, slender columns, and prestressed concrete. 2 hr. lec., 3 hr. lab.

271. *Steel Design*. 3 hr. PR: CE 110, 161; PR or Conc.: CE 261. Design of steel bridge and building systems with emphasis on connections, beams, columns, plastic design, and cost estimates. 3 hr. rec.

274. *Timber Design*. 3 hr. PR: CE 110, 161; PR or Conc.: CE 261. Fundamentals of modern timber design and analysis. Topics include wood properties, design of beams, columns, trusses and pole structures using dimension lumber, glue-laminated products, and plywood. 3 hr. rec.

275. *Transportation Systems Rehabilitation and Maintenance*. 3 hr. Introduction to rehabilitation and maintenance of transportation infrastructure; definitions, issues and problems; environmental impact, pavement and bridge maintenance and rehabilitation methods with special consideration of stability, scour, and subsidence. 3 hr. lec.

276. *Conceptual Design of Structures*. I. 3 hr. PR: CE 161 or consent. Classification, function, and conceptual analytical understanding of structural systems and components; design codes and modeling of loads; behavior of components and systems; design principles of structural systems. 3 hr. lec.

281. *Foundations Engineering*. 3 hr. PR: CE 181. The practice of geotechnical engineering, subsurface explorations, geotechnical analysis and design of shallow and deep foundations, retaining structures, stability of earth slopes, soil and site improvement. 3 hr. rec.

283. *Earthwork Design*. 3 hr. PR: CE 181. Use of soil mechanics principles in the analysis, design, and construction of earth structures. Principles of compaction and compaction control; an introduction to slope stability analysis and landslides, earth reinforcement systems, and ground improvement techniques. 3 hr. rec.

284. *Geotechnical Engineering Field Methods*. II. 3 hr. PR: CE 181. Soil exploration and groundwater sampling; in-situ determination of properties using the split spoon, cone, dilatometer, pressuremeter, and vane equipment. Instrumentation for monitoring field performance and challenges associated with exploration and monitoring in geotechnical/geoenvironmental engineering. 3 hr. lec.

290. *Civil Engineering Problems*. 1-6 hr. PR: Junior or senior standing. Special topics in various aspects of civil engineering analysis, design, and construction.

311. *Pavement Design*. 3 hr. PR: CE 281 or consent. Effects of traffic, soil, environment, and loads on the design and behavior of pavement systems. Design of pavement systems. Consideration of drainage and climate. Pavement performance and performance surveys. 3 hr. rec.

320. *Groundwater Dynamics*. 3 hr. PR: Consent. Introduction to groundwater, formulation of equations for saturated and unsaturated flow, analytical solutions for steady and transient cases, transport of pollutants and numerical techniques. 3 hr. rec.

322. *Free Surface Hydrodynamics*. I. 3 hr. PR: C E 122 or consent. The dynamics of liquid flow with a free surface under the influence of gravity; open channel hydraulics, wave motion, and buoyancy effects. 3 hr. lec.

328. *Groundwater Contaminant Transport*. I. 3 hr. PR: C E 320. Solute and particle transport; aqueous geochemistry; mathematics of mass transport; transformation; retardation, and attenuation of solutes; modelling contaminant transport and remediation. 3 hr. lec. (Every third year.)

332. *Airport Planning and Design*. 3 hr. PR: CE 132 or consent. Financing, air travel demand modeling, aircraft trends, traffic control, site selection, ground access, noise control, geometric design, pavement design, terminal facilities. 3 hr. rec.

333. *Geometric Design of Highways*. 3 hr. PR: Consent. The theory and practice of geometric design of modern highways. Horizontal and vertical alignment, cross-slope, design speed, sight distances, interchanges, and intersections. Critical analysis of design specifications. 2 hr. lec., 3 hr. lab.

334. *Introduction to Traffic Engineering*. 3 hr. PR: CE 132 or consent. The purpose, scope, and methods of traffic engineering. Emphasis on the three basic elements of each element and interactions between the elements. Laboratory devoted to conducting simple traffic studies, solving practical problems, and designing traffic facilities. 2 hr. lec., 3 hr. lab.

336. *Highway Planning*. 3 hr. PR: Consent. Theory and practice of highway investment decision-making with emphasis on quantitative techniques of traffic assignment and travel demand forecasting, system evaluation, establishing priorities and programming. Both rural and urban highway systems are considered. 3 hr. rec.

337. *Public Transportation Engineering*. 3 hr. PR: Consent. Design of rail and highway modes for urban and rural areas. Consideration of vehicle technology, facility and route design, conventional and paratransit services, and related marketing, finance and coordination issues. 3 hr. rec.

338. *Highway Safety Engineering*. 3 hr. PR: CE 231 or consent. Relationship between human, vehicular, and roadway factors which impact safety; functional requirements of highway safety features; legal aspects; accident analysis; evaluation of highway safety projects. 3 hr. rec.

339. *Traffic Engineering Operations*. 3 hr. PR: CE 334. Theory and practice of application of traffic engineering regulations; traffic control concepts for urban street systems and freeways; freeway surveillance and incident management; driver information systems; traffic control system technology and management. 3 hr. rec.

349. *Solid Waste Disposal*. 3 hr. PR: Consent. Patterns and problems of solid waste storage, transport, and disposal. Examinations of various engineering alternatives with appropriate consideration for air and water pollution control and land reclamation. Analytical approaches to recovery and reuse of materials. 2 hr. lec., 3 hr. lab.

350. *Sanitary Chemistry and Biology*. 3 hr. PR: C E 122 or consent. Study of physical and chemical properties of water. Theory and methods of chemical analysis of water, sewage, and industrial wastes. Biological aspects of stream pollution problems. 2 hr. lec., 3 hr. lab.

356. *Principles of Biological Waste Treatment*. 3 hr. PR: C E 350 or consent. Examination of biological treatment systems related to microbiology and function. Models used to describe system behavior and kinetics are developed. Laboratory and field experiments are performed to understand the relation between operation and design. 2 hr. lec., 3 hr. lab.

361. *Statically Indeterminate Structures*. 3 hr. PR: C E 261 or consent. Force and displacement methods of analysis; energy principles and their application to trusses, frames, and grids; effects of axial forces; influence lines for frames, arches, and trusses; secondary stress analysis. 3 hr. rec.

363. *Introduction to Structural Dynamics*. 3 hr. PR: C E 361 or 460. General theory for dynamic response of systems having one or several degrees of freedom. Emphasis on the application of dynamic response theory to structural design. 3 hr. rec.

364. *Nondestructive Material and Structural Evaluations*. II. 3 hr. PR: Consent. Nondestructive evaluation (NDE) using techniques based on mechanical and electromagnetic wave propagation; theory and applications of various NDE techniques including infrared thermography, dynamic characterization, seismic reflection and refraction, ultrasonics, acoustic emission, and radar. 3 hr. lec.

366. *Advanced Materials for Infrastructure*. I. 3 hr. PR: C E 270 and 271. Introduction to principles of material science; material structure, characterization at coupon and component level, practical information on fiber reinforced shapes; establishment of failure analysis and standardization. 3 hr. lec.

373. *Prestressed Concrete*. 3 hr. PR: C E 261, 270 or consent. Behavior and design of prestressed concrete members. Materials, bending, shear, torsion, methods of prestressing, prestress losses, deflections, compression members, composite members, indeterminate structures. 3 hr. rec.

380. *Soil Properties and Behavior*. 3 hr. PR: C E 281 or consent. Soil mineralogy and the physicochemical properties of soils and their application to an understanding of permeability, consolidation, shear strength, and compaction. Prediction of engineering behavior of soils in light of physicochemical concepts. 3 hr. rec.

381. *Soil Testing*. 3 hr. PR: C E 181 or consent. Experimental evaluation of soil properties and behavior. Emphasis is placed on the proper interpretation of experimental results and application of such results to practical problems. 1 hr. lec., 6 hr. lab.

382. *The Finite Element Method*. II. 3 hr. PR: Graduate standing in C E or MAE or consent. Introductory treatment of the theoretical basis of finite element method, mathematical formulation, different types of elements, stress analysis in solids, applications, and computer implementation.

385. *Airphoto Interpretation*. 3 hr. Study of techniques for obtaining qualitative information concerning type and engineering characteristics of surficial materials. Use of airphoto interpretation for evaluation of engineering problems encountered in design and location of engineering facilities. 3 hr. rec.

393. *Advanced Finite Element Methods*. 3 hr. PR: Consent. Formulation procedures and applications of finite element methods to two- and three-dimensional problems, techniques for nonlinear analysis computer implementation; applications in field problems, flow, and dynamics.

421. *Environmental Fluid Mechanics*. II. 3 hr. PR: Consent. Equations of motion including buoyancy and Coriolis force; mechanics of jets and plumes; diffusion, dispersion, and mixing in rivers, lakes, reservoirs, and estuaries 3 hr. lec. (Every third year.)

427. *Wastewater System Conveyance*. I. 3 hr. PR: C E 122 or equiv., or consent. Water and wastewater flows and measurement, design of water transportation systems, design of gravity-flow sanitary sewers and stormwater drainage systems, pumps and pump systems, and design of pumping stations. 3 hr. lec.

432. *Transportation Systems Analysis*. 3 hr. PR: Consent. Systematic examination of the interaction between transport technology, activity systems, and traffic flows. Quantitative analysis of the relationship among vehicle cycles, networks, congestion, choice behavior, cost functions, and resulting travel-market equilibration. 3 hr. rec.

440. *Deterministic Hydrology*. 3 hr. PR: Consent. An in-depth treatment of the dynamics of the accumulation of runoff, including the formulation of the unsteady surface flow equations and the unsteady saturated-unsaturated subsurface flow equations. Both analytical and numerical solutions are presented with applications. 3 hr. rec.

441. *Stochastic Hydrology*. 3 hr. PR: Consent. The use of probabilistic and random processes techniques in the study of hydrologic problems, including multivariate time series and frequency-domain analyses of hydrologic data, and stochastic modeling of multidimensional hydrologic processes. 3 hr. rec.

450. *Environmental Systems Engineering*. 3 hr. PR: CE 252 or consent. Mathematical and computer modelling of environmental systems with emphasis on decision-making; applications will be selected from some or all of the following areas: water quality, water resources planning, solid waste management, waste treatment. 3 hr. rec.

452. *Water Treatment Theory*. 3 hr. PR: CE 350. Theory of various procedures and techniques utilized in treatment of water for municipal and industrial use. Review of water quality criteria. Design of water purification facilities. 2 hr. lec., 3 hr. lab.

454. *Industrial and Advanced Waste Treatment*. 3 hr. PR or Conc.: C E 350 or consent. Basic physical and chemical unit operations used in industrial and advanced waste treatment; applications for waste water reclamation and reuse; study of industrial wastes from standpoint of process, source, and treatment. 2 hr. lec., 3 hr. lab.

458. *Design of Sanitary Works*. 3 hr. PR: C E 121. Water supply and waste water disposal problems. Design of treatment facilities. 2 hr. lec., 3 hr. lab.

460. *Finite Element Methods in Structural Analysis*. 3 hr. PR: C E 361 or consent. Relationships of elasticity theory; definitions and basic element operations; direct and variational methods of triangular and rectangular elements related to plane stress, plane strain, and flat plates in bending; variational principles in global analysis. 3 hr. rec.

461. *Bridge Engineering*. 3 hr. PR: C E 361 or consent. Statically indeterminate trusses, continuous trusses; steel and concrete arches; long-span and suspension bridges; secondary stresses. 3 hr. rec.

462. *Numerical Analysis of Engineering Systems*. 3 hr. PR: C E 361 or consent. Numerical methods for the solution of equilibrium, eigenvalue and propagation problems of dis-

crete and continuous structural systems with special emphasis on weighted residual techniques. 3 hr. rec.

470. *Behavior of Steel Members*. 3 hr. PR: C E 271 or consent. Elastic behavior of steel members subjected to axial load, bending, and torsion. Elastic and inelastic response of beams, columns, and beam-columns to load and the resulting design implications. Comparison with standard steel codes and specifications. 3 hr. rec.

471. *Light Gage Metal Design*. 3 hr. PR: C E 261, 271, or consent. Analysis and design of light gage material systems; flexural and compression members design; investigations into post buckling strength and optimum weight systems. 3 hr. rec.

473. *Structural Design for Dynamic Loads*. 3 hr. PR: C E 363 or consent. Nature of dynamic loading caused by earthquakes and nuclear weapons blasts; nature of dynamic resistance of structural elements and structural systems; criteria for design of blast-resistant and earthquake resistant structures; simplified and approximate design methods. 3 hr. rec.

475. *Analysis and Design of Multistory Structures*. 3 hr. (May be repeated once.) PR: CE 363, and CE 270 or 271. Introduction; service, structural and construction systems; analysis and design for lateral and gravity forces; structural modeling; computer applications; approximate methods; connections; foundations; review of standard building codes; special topics. 3 hr. rec.

476. *Behavior of Reinforced Concrete Members*. 3 hr. PR: CE 270 or consent. Studies of actual member behavior; members in flexure, combined flexure, shear, and torsion; bond and anchorage; combined axial load and flexure; slender columns; deep beams; derivation of current code provisions. 3 hr. rec.

481. *Advanced Mechanics of Soils*. 3 hr. PR: CE 181, 381, MAE 318 or consent. Stress invariants, stress history and stress path, elastic and quasi-elastic models for soils; soil plasticity, failure theories for soils; critical state soil mechanics, and determination of construction parameters. 3 hr. rec.

482. *Advanced Foundation Analysis*. 3 hr. PR: CE 281 or consent. Study of soil-structure interaction. Applications of principles of soil mechanics and numerical methods for analysis and design of geotechnical structures: strip footings, axially and laterally loaded piles, braced excavations, sheet pile walls, tunnel lining, and buried pipes and culverts. 3 hr. rec.

483. *Advanced Earthwork Design*. 3 hr. PR: CE 283 or consent. Application of the principles of theoretical soil mechanics to the design of embankments of earth and rock. In-depth study of compaction theory, stability of natural and man-made slopes by limit equilibrium and deformation considerations. 3 hr. rec.

484. *Groundwater and Seepage*. 3 hr. PR: Consent. Flow of groundwater through soils and its application to the design of highways and dams and to construction operations. Emphasis is placed on both the analytical and classical flow net techniques for solving seepage problems. 3 hr. rec.

485. *Geotechnical Risk Assessment*. 3 hr. PR: CE 281, 283 or consent. Application of probabilistic and statistical principles to geotechnical analysis and design. Random spatial

variability of soil properties; decision under uncertainty; reliability of geotechnical structures. 3 hr. rec.

486. *Soil Dynamics*. 3 hr. PR: CE 380 and consent. Consideration of the simple damped oscillator, wave propagation in elastic media, dynamic field and laboratory tests, dynamic soil properties, and foundation vibrations. Introduction to geotechnical aspects of earthquake engineering. 3 hr. rec.

488. *Geotechnical Case Histories*. 3 hr. PR: CE 281 and 283 or consent. Application of the principles of geotechnical engineering to professional practice as taught through the case histories approach. Study of actual problems in geotechnical engineering and their solutions. 3 hr. rec.

491. *Advanced Study*. 1-6 hr. PR: Consent. Investigations in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

495. *Seminar*. 1-2 hr. PR: Consent. Studies and group discussion of structural, fluid mechanics, surveying, transportation, soil mechanics and foundations, and sanitary problems.

496. *Graduate Seminar*. 1 hr. PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of the student's program.

497. *Research*. 1-15 hr.

498. *Thesis*. 2-4 hr. PR: Consent.

Electrical and Computer Engineering

Roy S. Nutter, Jr., Ph.D., P.E., Chairperson

Muhammad A. Choudhry, Ph.D., Graduate Coordinator

823 Engineering Science Building

e-mail: ece-info@cemr.wvu.edu

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Degrees Offered:

Master of Science in Electrical Engineering

Master of Science in Engineering with a major in Electrical or Computer Engineering

Doctor of Philosophy with a major in Electrical or Computer Engineering

Faculty

The Department of Electrical and Computer Engineering, with 16 faculty members, 250 undergraduate students, and over 75 graduate students, offers an excellent graduate program. Faculty members in the department have diverse and extensive expertise in industry, research, and graduate instruction, providing opportunities for students to pursue graduate study in either theory-oriented or application-oriented fields.

Facilities

The department has offices and instruction laboratories on three floors in the Engineering Sciences Building and research laboratories which are located in the Engineering Research Building. The research laboratories consist of Power and Control Systems, Communication Systems, Flexible Automation in Underground Mining, Mine Management Support, Computer Automation, Computer Aided Lumber Processing, Neural Network Applications, and Microelectronic Systems. The Microelectronics Systems Research Center is located within the department. All departmental graduate students have access to mainframe workstations and personal computers, and various work stations for both class work and research. Through external funding, the department maintains modern test equipment, microprocessor/digital-signal-processing development systems, computers, specialized software, and other equipment.

Computing Facilities

The Department of Electrical and Computer Engineering operates and maintains a number of dedicated computers running the UNIX operating system. These computers support both the instructional and research activities of the department. These systems are SUN workstations, PCs, and a variety of stand-alone microcomputers. Students and faculty can access several software packages via the Novell network in the College of Engineering and Mineral Resources. In addition the department is linked to two college servers and to the extensive computing facilities of WVNET by means of an ETHERNET and FDDI system. The department has access to several additional worldwide computing services via INTERNET and the Pittsburgh Supercomputing Center.

Programs

The Department of Electrical and Computer Engineering offers programs leading to the master of science in electrical engineering (M.S.E.E.) and participates in the College of Engineering and Mineral Resources interdisciplinary program offering the master of science in engineering (M.S.E.) and the doctor of philosophy (Ph.D.), all with specialization in electrical engineering or computer engineering. Master of science students must comply with the rules for master's degrees as set forth by both the college in the *Guidelines for Masters Degree Programs Offered in the College of Engineering and Mineral Resources* and by the department in the *Master of Science Program Guidelines*. Doctor of philosophy students must comply with the rules set forth by both the college in *The College of Engineering and Mineral Resources Doctor of Philosophy Program Guidelines* and the department in the *Doctor of Philosophy Program Guidelines*.

Admission

Applications for admission to the graduate program are made through the Office of Admissions and Records, P.O. Box 6009, Morgantown, WV 26506-6009. Informational inquiries may be addressed to the Graduate Coordinator of Electrical and Computer Engineering, P.O. Box 6104, Morgantown, WV 26506-6104.

Admission requirements for the M.S. program may be summarized as follows:

- An applicant must have an excellent record in previous college work. A minimum cumulative grade-point average of 3.0 (of 4.0), or its equivalent, is required for admission as a graduate student in electrical and computer engineering.
- All applicants must submit scores of the Aptitude Test of the Graduate Record Examination (GRE). A score of 80 percentile rank is required on the quantitative part of the test.
- All students whose native language is not English must submit Test of English as a Foreign Language (TOEFL) scores. A minimum score of 550 is required for admission. In addition, they must attend New Student Orientation and take the Michigan Test of

English. The results of this test will determine if the student will be required to take English as a Foreign Language (EFL) course(s).

- An applicant not qualified for the regular graduate student admission status, due to insufficient grade-point average, incomplete credentials, or inadequate academic background, may be admitted as a provisional student. Requirements for attaining regular student status must be stated in the letter of admission. Provisional students must sign a contract listing these requirements in detail no later than their first registration.

Doctor of Philosophy Admission

Admission to the doctor of philosophy program in ECE is open to students who qualify unconditionally for graduate study (see above under M.S. admission) and who have obtained an M.S. degree in science or engineering. In addition to transcripts and test scores required for M.S. admission, Ph.D. applicants must submit three letters of recommendation and a statement of purpose. Ph.D. applicants without a master's degree will be admitted to a master's program as the first stage in attaining the Ph.D.

All students beginning graduate study will be given an entrance interview by the graduate coordinator to assist them in choosing classes before the end of the first week of classes of the semester they arrive on campus. The interview determines if the student needs remedial course work in order to pursue a graduate degree. Subsequently, an advisory and examining committee (AEC) must be formed and a plan of study prepared before the student registers for the second semester of classes. The student must declare a primary emphasis area within the department on the plan of study, as well as the intended option (course work, report, thesis) and courses to be taken.

Students with deficiencies in their undergraduate programs may be required to take some courses as prerequisites for graduate courses. These deficiencies are usually noted as a condition for admission. However, they may also be specified as a result of the entrance interview or by the AEC.

Areas of Research

The department is enthusiastically and vigorously involved in research, technical publication, and graduate instruction at the forefront of the field. The areas of emphasis are:

- Computer systems, including microprocessor applications, advanced computer architecture, neural networks, fuzzy logic, parallel processing, VLSI testing techniques, fault tolerant design, software metrics, and software engineering.
- Control systems, including classical and modern control theory and applications.
- Communications and signal processing, including computer networks and image processing systems.
- Electric power systems and power electronics, including stability and control, transients, and steady state analysis, real time control, protection, electric machines, drives, and advanced motion controllers, electric and hybrid electric vehicles.
- Electronics, including integrated circuit devices, VLSI, optoelectronics, high performance packaging, and microfabrication.

Computer Systems

Computer engineering is a very broad area, covering hardware, firmware, and software components of complex digital systems and system components. Software and hardware systems design are the most technologically intensive components of the electrical and computer engineering curriculum. A large selection of hardware and software graduate courses are offered in the department. These cover topics such as switching

theory, digital communication systems, VLSI design and testing, fault-tolerant computing, computer architecture, neural networks, applied fuzzy logic, real-time software design and development, and C++ object-oriented programming. In addition, the department collaborates very closely with the computer science faculty. Graduate students in the computer engineering area are encouraged to include courses from the Computer Science Department in their program. A broad spectrum of research topics of both applied and theoretical nature are undertaken in the department. Some examples are: software verification and validation, software process improvement, software development environments for signal processing applications, parallel processing of fingerprint image comparison systems, fast adaptive routing algorithms for processor arrays, communication switching systems, information systems, computational accelerator using digital signal processing arrays, an automated lumber processing system, neural network medical and industrial applications, autonomous robotics, computer controlled electric and hybrid vehicle instrumentation, a distributed microprocessor monitoring system, knowledge-based decision support system, and microprocessor-based instrumentation. The department offers dedicated laboratories equipped with personal computers and workstations to support classroom instruction and research. A number of computer engineering faculty have close cooperation with several interdisciplinary research centers at WVU such as the Concurrent Engineering Research Center, the Alternate Fuel Research Center, and the Constructed Facility Research Center.

Control Systems

The study of control systems is highly mathematical with a broad range of applications. This subject area interests those who wish to apply technology to the control of dynamical systems, for which signals from sensors, usually processed by a computer, are necessary. Consequently, the student interested in control systems will also take course work in computer systems and digital signal processing. The graduate curriculum in control and systems engineering consists of courses in both classical and modern control theory and applications, including modeling techniques in both the frequency and time domains for continuous and discrete time systems, optimal control, digital control, and estimation theory; classical techniques for control systems and design tools such as root locus, Nyquist, and Bode methods for linear time-variant systems are also included. Additional courses are available in adaptive control, large scale systems, and stochastic control. Currently, the faculty in control systems are actively involved in a number of research areas, including both sponsored and unsponsored research activities, with some projects relating to specific applications and some being of a theoretical nature and having a wide range of applications. Research projects in control and systems engineering include: research in large scale systems, design of fast-estimation algorithms for distributed systems, reduced-order systems design, application of H-infinity methods, nonlinear systems control, deconvolution methods for seismic signal processing, and application of control theory to power systems and communications.

Faculty research in the control area currently is sponsored by the U.S. Department of Energy, the National Science Foundation, the state of West Virginia, and private organizations.

Communications/Signal Processing

Communications and signal processing, though distinct topics, are alike in many ways. Communications has evolved rapidly from the basic voice telephone service to a rich set of communications systems carrying voice, data, video, and other information. The integration of computers with communications systems has enabled powerful information systems for a wide range of applications. Advances in signal processing theory,

physical technologies, and powerful digital signal processors (DSPs) have combined to dramatically expand the applications of signal processing.

Research activities address the primary areas of theory, technology, and applications. Research in communications theory explores new principles for higher performance or improved analysis of communications systems. Signal processing theory research explores new principles for the understanding and manipulation of analog and digital signals. These theoretical foundations drive a wide range of applied research. Projects include state space approaches to adaptive equalization and optimal and robust receivers for CDMA.

Research on technologies extends from basic devices through full testbed systems. Projects include photonics and high speed electronics for optical communications, advanced system packaging and interconnections for high performance systems, and parallel DSP arrays.

Applications research includes information systems which integrate computing and communications for distance education, distance collaborations and other information-age applications. Image processing applications in areas such as pattern matching, medical imaging, and inspection systems are also investigated.

Electrical Power Systems

Electrical power systems historically have been an area of emphasis in the electrical engineering curriculum, and the graduate program in power systems at WVU is mature. Five graduate courses are offered on a regular basis. In addition, there are four senior elective/graduate courses: distribution, industrial power systems, power electronics, and advanced power systems analysis. Recent and current research activities include: reliability, grounding, transmission, electric transportation, modeling, stability analysis, optimal design, design of modulation controllers for multiterminal ac/dc power systems, electric drives, electric machines, advanced motion control systems, and power electronics. Externally funded projects include: robust design of modulation controllers for flexible ac/dc transmission lines, optimal design of permanent magnet brushless machines, spacecraft power storage controllers, investigation of voltage/current characteristics of MOS-controlled thyristors with static and dynamic loads, and identification and decentralized control of critical modes. These projects provide excellent support for both graduate student and faculty research. Extensive interaction with industry provides ample opportunity for direct contact with practitioners in the field.

Microelectronic and Photonic Systems

Courses are offered in advanced circuit analysis, integrated circuits (both analog and digital), noise and grounding, power electronics, and VLSI design. Recent research efforts include electronic instrumentation and control, characterization of MCTs (MOSFET controlled thyristors), and development of capacitive sensors for robotics applications. A major new thrust is in the area of VLSI design, including circuit fundamentals, device physics, and system principles, along with teaching the fundamentals of CAD/CAE tools. A new laboratory has been set up for optoelectronic and wafer-scale integrated circuit research.

Master of Science in Electrical Engineering

There are three options available for students to gain a master's degree: Course work only (subject to the student's AEC approval), thesis, or problem report.

Course Work/Thesis/Problem Report

Students following the course work program must take a minimum of 33 credit hours of course work plus two hours of graduate seminar. Students following the

problem report option must take a minimum of 30 hours of course work, two hours of graduate seminar, and a minimum of three credit hours of research or independent study leading to a problem report. Students following the thesis option must take a minimum of 24 credit hours of course work, two hours of graduate seminar, and a minimum of six credit hours of thesis research. Those students who lack course prerequisites may require more than three semesters of full-time study to complete the degree. Students supported by research assistantships may also require more than three semesters to complete the degree and are expected to pursue the thesis option.

Students pursuing either the thesis or problem report option leading to the M.S. degree must have the thesis or problem report approved by the Advisory and Examining Committee before it be accepted. The student must also pass a final oral examination and defense of the thesis or problem report administered by the AEC.

Master of Science in Engineering Program

The master of science in engineering program is available to students who are interested in graduate work in electrical or computer engineering but hold a baccalaureate degree from another field of engineering or from another discipline. Students with a baccalaureate degree from another field of engineering or from one of the sciences should contact the department for further information. In general, a student in the M.S.E. program will be expected either to complete certain undergraduate prerequisite courses or to attain equivalent competence but may not be required to complete all of the requirements equivalent to the B.S.E.E. or B.S.C.E. degree. However, all graduate students will be required to meet the prerequisites for each course taken for credit.

Doctor of Philosophy Program

The doctor of philosophy program should be considered by those with the superior academic achievement and desire to pursue a career of research or teaching. Students interested in the Ph.D. program in electrical engineering or computer engineering should contact the department for information.

Program Length A typical Ph.D. program will take between three to four years beyond the baccalaureate degree, although scholarly achievements are more important than the length of the program, which does not depend solely on the accumulation of credit hours. The courses chosen for a program are selected to develop expertise in the student's area of interest and to strengthen knowledge of other areas that will support research endeavors.

Examinations Ph.D. students are required to pass a written qualifying examination, normally within one year of their first enrollment in the Ph.D. program. The student must complete course work requirements as specified by the AEC, at least 18 hours of which must be at the 300 and 400 level at WVU. The student is also required to pass a written and oral candidacy examination given by the AEC and to successfully defend in oral examination a written research proposal. When all required course work is completed, the qualifying and candidacy examinations are passed, and the research proposal is successfully defended, the student is formally admitted to candidacy for the Ph.D. degree. For full-time students, admission to candidacy must occur within three years of entering the Ph.D. program. After the student completes the research (at least 24 credit hours) and prepares a dissertation, the final examination consists of a public defense of the dissertation. All requirements for the degree must be completed within five years after the student has been admitted to candidacy.

Research Research work for the doctoral dissertation is expected to represent a significant contribution to engineering. It may entail a fundamental investigation into a specialized area or a broad and comprehensive system analysis or design.

Computer Engineering (CPE)

242. *Introduction to Digital Computer Architecture*. 3 hr. PR: MATH 215, CP E 110, 111. Control, data, and demand-driven computer architecture; parallel processing, pipelining, and vector processing; structures and algorithms for array processors, systolic architecture.

270. *Digital Systems Design*. 3 hr. PR: CP E 71. Hierarchical design methods, from the machine architecture, through data flow concepts and control flow concepts, to implementation. Topics include: design methodology, design techniques, machine organization, control unit implementation and interface design. 3 hr. lec.

271. *Switching and Automata Theory*. 3 hr. PR: CP E 71, 110, and MATH 215. Reliable design and fault diagnosis; synchronous and asynchronous sequential machines; finite state machines with automata theory.

291. *Special Topics*. I, II, S. 1-3 hr. PR: Consent. Investigation of topics not covered in regularly scheduled courses.

370. *Switching Circuit Theory 1*. 3 hr. PR: CP E 71 or equiv. Course presumes an understanding of the elements of Boolean or switching algebra. Study of both combinational and sequential switching circuits with emphasis on sequential networks. Advanced manual design and computer-aided design techniques for single and multiple output combinational circuits. Analysis and design of sequential circuits. Detection and prevention of undesired transient outputs. 3 hr. rec.

372. *Advanced Computer Architecture*. 3 hr. PR: CP E 71 and 110, 111 or consent. Formal tools for designing large digital systems are introduced; formal descriptive algebras such as ISP, PMS, AHPL, CDL, and others. An in-depth study of computer system designs including instruction design and data path design. 3 hr. rec.

373. *Design of Computer Arithmetic Circuits*. 3 hr. PR: CP E 71 or equiv. Study of logic networks usable in performing binary arithmetic. Emphasis is on design of high-speed, parallel arithmetic units using binary numbers. Consideration of systems for representation of negative numbers. Available arithmetic subsystems are studied. 3 hr. rec.

390. *Advanced Independent Study*. 1-6 hr. PR: Consent. Individual investigation in advanced electrical engineering subjects not covered in formal courses.

391. *Advanced Topics*. I, II, S. 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

397. *Master's Degree Research or Thesis*. I, II, S. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

471. *Switching Circuit Theory 2*. 3 hr. PR: CP E 370, MATH 236, or equiv. Switching circuit theory is used to model the operations of networks of logic gates and flip-flops. Networks of this type are one form of discrete parameter systems. Studies the use of

linear sequential machine as a means of modeling the general class of discrete parameter information systems. Systems approach and the techniques of abstract algebra used throughout. 3 hr. rec.

472. *Digital Systems Design 2*. 3 hr. PR: CP E 372 or consent. Students will design a specific digital system, i.e., CPU control, interrupt structure, memory, or input/ output system. They will design and test a project oriented toward one specific objective.

491. *Advanced Study*. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

497. *Research*. 1-15 hr.

Electrical Engineering (E E)

216. *Fund of Control Systems*. 3 hr. PR: E E 124. Introduction to classical and modern control; signal flow graphs; state-variable characterization; time-domain, root locus, and frequency techniques; stability criteria. 3 hr. rec.

230. *Electr Power Distribution Syst.* 3 hr. PR: E E 131, 136 or consent. General considerations; load characteristics; subtransmission and distribution substations; primary and secondary distribution; secondary network systems; distribution transformers; voltage regulation and application of capacitors; voltage fluctuations; protective device coordination. 3 hr. rec.

231. *Power Systems Analysis*. 3 hr. PR: E E 131, 136 or consent. Incidence and network matrices, Y-Bus, symmetrical and unsymmetrical faults, load-flow and economic dispatch, MW-frequency and MVAR-voltage control. The power system simulator will be used for demonstrations. 3 hr. rec.

236. *Intro to Power Electronics*. 3 hr. PR: E E 130 and 158, 159 (concurrently) or consent. Application of power semiconductor components and devices to power system problems; power control, conditioning processing, and switching. Course supplemented by laboratory problems. 3 hr. lec.

248. *Fiber Optic Communications*. 3 hr. PR: E E 126, 141, 151. Fundamentals of optics and light wave propagation, guided wave propagation and optical wave guides, light sources and light detectors, couplers, connections, and fiber networks, modulation, noise, and detection in communication systems. 3 hr. rec.

251. *Noise and Grounding of Electronic Systems*. 1 hr. PR: E E 158, 159 or consent. Analysis of extrinsic and intrinsic noise in electronic circuits. Design techniques to reduce or eliminate noise. 1 hr. rec.

252. *Operational Amplifier Applications*. 3 hr. PR: E E 158, 159. Linear integrated circuit building blocks applied to such functions as amplification, controlled frequency response, analog-digital conversion, sampling, and waveform generation. 2 hr. lec., 3 hr. lab.

257. *Transistor Circuits*. 3 hr. PR: E E 158, 159 or equiv. Analysis and design of subcircuits used in analog integrated circuit modules. Transistor models, low-frequency response of multistage amplifiers, current sources, output stages and active loads. 3 hr. lec.

264. *Introduction to Communications Systems*. 3 hr. PR: E E 126. Introduction to the first principles of communications systems design. Analysis and comparison of standard analog and pulse modulation techniques relative to bandwidth, noise, threshold, and hardware constraints. Communications systems treated as opposed to individual circuits and components of the system. 3 hr. lec.

268. *Digital Signal Processing Fundamentals*. 3 hr. PR: E E 126, 127, 156, 157. Theories, techniques, and procedure used in analysis, design, and implementation of digital and sampled data filters. Algorithms and computer programming for software realization. Digital and sampled data realizations, switched capacitor and charge-coupled device IC's. 3 hr. lec.

281. *Biomedical Electrical Measurements*. 2 hr. PR: E E 158 and 159 or consent. Bio-medical instrumentation for human subjects. Origin and characteristics of biological electrical signals. Instrument design requirements and detailed analysis of cardiac support and intensive-care monitoring equipment. 2 hr. lec.

291. *Special Topics in Electrical Engineering*. 1-3 hr. PR: Junior, senior, or graduate standing, or consent. The investigation of advanced topics not covered in regularly scheduled courses. 1-3 hr. lec.

314. *Stochastic Systems Theory*. 3 hr. PR: Consent. Probability distribution and density functions. Bayes rule and conditional probability. Stochastic process and linear systems. Gauss-Markov Process. Optimal linear estimation. Introduction to Wiener and Kalman filtering. Decision theory fundamentals. 3 hr. rec.

315. *Linear Control Systems*. 3 hr. PR: Consent. Basic concepts in the theory of linear control systems: state variable representation, solution of state equations, controllability, observability, stability, transfer function descriptions, design of controllers and observers. 3 hr. rec.

316. *Optimal Control*. 3 hr. PR: Consent. Methods of direct synthesis and optimization of feedback systems; Wiener theory; Pontryagin's maximum principle; dynamic programming; adaptive feedback systems. 3 hr. rec.

317. *Digital Control*. 3 hr. PR: E E 216 or equiv. or consent. Sampling of continuous-time signals; transform analysis; analysis of discrete-time systems. Translation of analog design. Controllability and observability; State-space design methods; and introduction to optimal control for discrete systems. 3 hr. rec.

325. *Advanced Linear Circuit Analysis*. 3 hr. PR: Consent. Systematic formulation of circuit equations. Use of operational techniques to find total solutions. Applications and characteristics of the Laplace and Fourier transforms, matrix algebra, complex variable theory and state variables are made to circuit analysis and elementary circuit synthesis. 3 hr. rec.

330. *Advanced Electrical Machinery*. 3 hr. PR: E E 131, 136 or consent. Theory and modeling of synchronous, induction, and direct-current machines, and their steady-state and transient analysis. 3 hr. rec.

333. *Comp Appl Power Syst Analysis*. 3 hr. PR: E E 231 or consent. Steady state analysis by digital computers of large integrated electrical power systems. Bus admittance

and Impedance matrices, load flow studies, economic dispatch and optimal power flow, steady state security analysis, fault studies. 3 hr. rec.

334. *Power Syst Contr and Stability*. 3 hr. PR: E E 131, 315. Review of stability theory, classical transient analysis, dynamical models of synchronous machines, power system stability under small and large perturbations, dynamic simulation of power systems. 3 hr. rec.

350. *Electronic Circuits*. 3 hr. PR: E E 158 and 159, or equiv. Analysis and design of electronic circuits; low-pass amplifiers, feedback, frequency response and stability of feedback amplifiers, nonlinear analog circuits. 3 hr. rec.

357. *Linear Integrated Circuits*. 3 hr. PR: E E 158, 159 or equiv. (Primarily for students specializing in communication and electronics.) Techniques of integrated circuit design and fabrication. Development of models descriptive of linear and nonlinear transistor operation. Design and analysis of high-frequency tuned, direct-current, and differential amplifiers. 3 hr. rec.

358. *Integrated Logic Circuits*. 3 hr. PR: E E 156, 157 or equiv. or consent. (Intended for students specializing in digital circuits.) Techniques of integrated circuit design and fabrication. Development of transistor model for nonlinear operation. Design, analysis, and comparison of emitter-coupled, direct-coupled, diode-transistor, and transistor-transistor integrated logic circuits. 3 hr. rec.

364. *Communication Theory*. 3 hr. PR: E E 264 or consent. Detailed study of probability theory and its use in describing random variables and stochastic processes. Emphasis on applications to problems in communication system design. 3 hr. rec.

366. *Information Theory 1*. 3 hr. PR: E E 364. Probability concepts; theory of discrete systems; encoding; theory of continuous systems; systems with memory; the fundamental theorem of information theory. 3 hr. rec.

390. *Advanced Independent Study*. 1-6 hr. PR: Consent. Individual investigation in advanced subjects not covered in formal courses.

391. *Advanced Topics*. I, II, S. 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

397. *Master's Degree Research or Thesis*. I, II, S. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

411. *Nonlin Control System Analysis*. 3 hr. PR: Consent. Application of Liapunov's and Popov's methods to nonlinear control systems, together with classical techniques. 3 hr. rec.

413. *Sample-Data Control Systems*. 3 hr. PR: E E 312 or consent. A study of control systems in which the activating signal is represented by samples at regular time intervals. 3 hr. rec.

415. *Large-Scale Syst Modeling Cont*. 3 hr. PR: E E 315. Characterization of large-scale systems, model simplification through aggregation and perturbation methods, optimal and chained aggregation, balanced realization and cost component procedures; optimal model reduction; simplification effects; decentralized control: feasibility and design. 3 hr. lec.

416. *Stochastic Estimation and Control*. 3 hr. PR: E E 316 or consent. Techniques of optimal estimation and control for linear systems. Balanced emphasis is placed on both continuous and discrete time systems. Some advanced topics of interest will be considered. 3 hr. rec.

430. *Real-Time Contr of Power Syst.* 3 hr. PR: E E 315, 316, 333. Application of computers to modern control theory for reliable and economic real-time operation of integrated power systems. 3 hr. rec.

432. *Protection of Power Systems*. 3 hr. PR: E E 231 or consent. Principles of relay protection for faults on transmission lines and other devices. Use of overcurrent, differential distance, and pilot relaying systems. Special relay applications. Determination of short-circuit currents and voltages from system studies. 3 hr. rec.

245. *Microwave Circuits and Devices*. 3 hr. PR: E E 141. UHF transmission line theory, impedance matching techniques and charts, general circuit theory of one port and multiports for waveguiding systems, impedance and scattering matrices, wave guide circuit elements, microwave energy sources. Course will be supplemented by laboratory problems. 3 hr. lec.

466. *Information Theory 2*. 3 hr. PR: E E 366. Continuation of E E 366. 3 hr. rec.

491. *Advanced Study*. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

496. *Graduate Seminar*. 1 hr. PR: Consent. Technical presentations by faculty members, outside speakers, and graduate students. Each student will give an oral presentation describing the student's research before the student's final examination. This will typically be a 40-minute presentation before the faculty and graduate students.

497. *Research*. 1-15 hr.

Industrial and Management Systems Engineering

Ralph W. Plummer, Ph.D., P.E., Chairperson

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Degrees Offered:

Master of Science in Industrial Engineering

Master of Science in Occupational Hygiene and Occupational Safety

Master of Science in Engineering with a major in Industrial Engineering

Doctor of Philosophy with a major in Industrial Engineering

Graduate programs in industrial and management systems engineering are designed to give students experience in developing innovative solutions to real problems by implementing creative ideas. Graduate students in the department are actively involved with people and organizations in need of creative solutions to real problems. Students can expect to develop their creative abilities in order to be effective in innovative environments while improving their abilities to communicate and implement new ideas.

Faculty

Faculty members of the Department of Industrial and Management Systems Engineering possess broad experience in business, teaching, and research. This combination of backgrounds enriches a student's educational experience.

Research

The department has quality research laboratories in manufacturing, robotics and vision systems, CAD/CAM, decision sciences, ergonomics, industrial hygiene, and safety engineering. Graduate students are encouraged to utilize these resources to explore and develop their capabilities.

Degree Programs in Industrial Management Systems Engineering

Three degrees are offered at the master's level: M.S.I.E., M.S.E., and M.S. with an emphasis in occupational hygiene and occupational safety. The M.S.I.E. degree program is appropriate for students with a B.S. in industrial engineering, and the M.S.E. degree program is designed for students having a baccalaureate degree in a technical field other than industrial engineering who wish to pursue a broader, more interdisciplinary program of graduate studies. In both the M.S.I.E. and the M.S.E. degree programs, students will select courses from decision sciences and production systems, manufacturing systems, and ergonomics. A description and listing of requirements for the M.S. in occupational hygiene and occupational safety, which is administered by the Department of Industrial and Management Systems Engineering, is presented below.

An undergraduate degree in either another engineering field or the basic sciences is required for admission to both the M.S.E. and M.S. programs. Students trained in the areas of mathematics, statistics, physics, computer science, and engineering majors are generally well prepared for graduate study with an emphasis in decision sciences/operations research techniques or production systems, while many chemistry, biology, and engineering majors will find excellent career opportunities in the field of occupational hygiene and occupational safety.

Admission To qualify as a regular student, applicants must have as a minimum, the equivalent of a 3.00 GPA. Applicants with a minimum 2.50 GPA (or the equivalent) may be admitted on a provisional basis. Foreign students must demonstrate proficiency in communicating in English (550 or more in TOEFL).

Students must comply with the rules and regulations as outlined in this catalog for graduate work in the College of Engineering and Mineral Resources. Each master's candidate prepares a planned program of study that contains a minimum of 30 semester credit hours, including a thesis of six hours of research credit; or 36 credit hours, including a problem report of not more than three hours of research credit.

Required Courses Required courses for the M.S.I.E. and the M.S.E. are determined by the student's area of emphasis (i.e., decision sciences, manufacturing systems, or applied ergonomics). The M.S. in occupational hygiene and occupational safety course requirements are listed under those areas.

Thesis The thesis or problem report must conform to the general requirements of the University and to written requirements of the Department of Industrial and Management Systems Engineering.

Oral Examination A candidate will be required to pass an oral examination on course work and the thesis or problem report.

Doctor of Philosophy

A candidate for the degree of doctor of philosophy (Ph.D.) must comply with the rules and regulations of the College of Engineering and Mineral Resources and the University. To be accepted in the Ph.D. program, applicants should have as a minimum the equivalent of a 3.40 GPA in their graduate work. They must also meet all the entrance requirements stated earlier for the master programs. Each student will develop a program with a major in industrial engineering, designed to meet his/her needs and objectives in consultation with the an advisor and the advisory and examining committee. Required core courses for the Ph.D. program are determined by the student's area of emphasis. In general, Ph.D. students take approximately 54 hours of course work beyond their baccalaureate degree, with a minimum of 30 hours in industrial engineering. The research work for the doctoral dissertation may entail a fundamental investigation or a broad and comprehensive investigation into an area of specialization.

Early in the doctoral program, the student must pass an examination to demonstrate master's-level proficiency in industrial engineering subject matter. Upon completion of the course work, the student must pass a written examination in order to be admitted to candidacy. An acceptable dissertation must be written and defended.

Degree Program in Occupational Hygiene and Occupational Safety

The three disciplines that form the basis of occupational hygiene and occupational safety are industrial hygiene, industrial safety, and ergonomics. The program blends essential information from these underlying disciplines to provide master's level students with the broad background necessary to be effective in today's complex occupational hygiene and occupational safety environment while still giving students the opportunity to emphasize one area.

Occupational hygiene and occupational safety looks to no specific discipline for problem solution. Rather, it integrates the content of a broad variety of scientific and technical areas to produce technically sound and economically feasible solutions to safety and health problems in the workplace. Thus, no specific undergraduate degree is required for admission to the program. Instead, a minimum of 60 credit hours of approved science, mathematics, and other technical courses are required. Of these, at least 15 must be junior or senior level. Admission preference is given to students with degrees in engineering, physical science, or mathematics. A grade-point average of at least 3.0 is required in previous course work. GRE scores will be considered in the admission decision.

Pre or Corequisite Courses

The following are considered pre or corequisite courses: one semester of statistics, two semesters of chemistry, two semesters of physics, and one semester of computer programming. On an individual basis, the faculty may identify additional pre or corequisite course work. Applicants will be advised about their specific requirements at the time of admission. Applicants not meeting all of the listed requirements may be considered for admission as provisional students.

The degree requirements include completion of a minimum of 36 credit hours, a final grade-point average of at least 3.0, and completion of a three-hour problem report or a six-hour thesis. The typical plan of study is as follows:

Fall

IMSE 260 *Human Factors Engineering*
IMSE 261 *System Safety Engineering I*
IMSE 361 *Industrial Hygiene Engineering*
OHOS 321 *Epidemiology*

Spring

IMSE 364 *Industrial Ergonomics*
OHOS 325 *IH Sampling and Analysis*
PCOL 362 *Occupational Toxicology*
IMSE 480 *Fire Protection Engineering*
OHS/Occupational Medicine elective

Summer

OHOS 326 *Safety and Health Measurement and Instrumentation*
OHOS 328 *Noise and Ventilation Control Technology*

Typical Electives

CE 245, 251, 290, 349, 350, 480
IMSE 214, 314, 325, 340, 360, 362, 368
MAE 28 *Engineering Acoustics*
MAE 330 *Instrumentation Engineering*
CHE 260 *Chemical Process Safety*
MANG 216 *Personnel Management*
STAT 312 *Statistical Methods 2*
CCMD 350 *Radiation Safety in Isotope Usage*
CMED 491 *Advanced Study*

Electives should be selected to enhance a student's overall professional and technical capability based on the his/her interests and background. They must be approved by the student's faculty advisor. Generally, electives will come from environmental engineering, safety engineering, industrial hygiene, or occupational medicine.

Industrial and Management Systems Engineering (IMSE)

201. *Principles of Solidification*. 3 hr. PR: IMSE 202 and 203 or consent. Material and energy balances, solidification of metals, riser and gating systems for castings, fluidity of metal, casting design, and molding processes.

202. *Manufacturing Processes*. 2 hr. PR: CH E 105, MAE 43. Lectures and demonstrations relating to materials, properties, parameters, design, equipment, economics and computer control of processing systems emphasizing casting, machining, joining and forming operations.

203. *Manufacturing Processes Laboratory*. 1 hr. Coreq.: IMSE 202. Laboratory experiments and demonstrations of the basic manufacturing operations of casting, machining and joining. Process parameter measurement, inspection techniques and CNC programming are performed and laboratory report writing is emphasized.

205. *Design for Manufacturability*. 2 hr. PR: IMSE 202 and IMSE 203. Aspects of design, manufacturing and materials; emphasis on design for manufacturability and assembly, including material selection and manufacturing processes on product cost. 2 hr. lec.

206. *Design for Manufacturability Laboratory*. 1 hr. PR: IMSE 202 and IMSE 203. Laboratory tasks dealing with manufacturing and materials; process selection, and cost estimation for component and subassembly design; emphasis on utilizing design for manufacturability and assembly software. 1 hr. lab.

211. *Expert Systems in Manufacturing*. 3 hr. PR: IMSE 202, 203, 281. Expert systems design and development for manufacturing applications; knowledge acquisition, representation, search techniques, inference engines, data base interfaces, algorithmic interfaces. 3 hr. lec.

214. *Analysis of Engineering Data*. 3 hr. PR: IMSE 113. Introduction to linear statistical models. Design and analysis of simpler experimental configurations occurring frequently in engineering studies. Similarities and differences between regression and experimental design models emphasized in a vector-matrix setting.

215. *Statistical Decision Making*. 3 hr. PR or Conc.: IMSE 113. Basic concepts of probability theory. Discrete and continuous distributions, joint and derived distributions, with application to industrial and research problems. Introduction to generating functions and Markov chains.

216. *Industrial Quality Control*. 3 hr. PR: IMSE 113. Principles and methods for controlling the quality of manufactured products, with emphasis on both economic and statistical aspects of product acceptance and process control.

217. *Total Quality Management*. 3 hr. PR: IMSE 113. Fundamentals and philosophy of total quality management in industry and government. Includes implementation of quality function deployment and the tools of off-line and on-line quality assurance procedures.

222. *Job Evaluation and Wage Incentives*. 3 hr. Principles used in evaluating jobs, rates of pay, characteristics and objectives of wage incentive plans; incentive formulae and curves.

240. *Labor and Productivity*. 3 hr. PR: Consent. The work force as a critical element of productivity. Topics include industrial engineering involvement in collective bargaining, labor relations, and work practices.

242. *Production Planning and Control*. 3 hr. PR: IMSE 140; Conc.: IMSE 214. Principles and problems in forecasting, aggregate planning, material management, scheduling, routing, and line balancing.

243. *Facility Planning and Design*. 3 hr. PR: IMSE 242, 250. Problems of facility and equipment location. Long-range planning of industrial facilities. Block and detailed layout of manufacturing plants and general offices. Space utilization and allied topics in facility design.

249. *Design of Dynamic Materials Systems*. 3 hr. PR: IMSE 140 or consent. Application of industrial engineering theory and practice to selection of material systems and equipment including efficient handling of materials from first movement of raw materials to final movement of finished product. Present quantitative design techniques.

250. *Introduction to Operations Research*. 3 hr. PR: IMSE 113, 281. Basic tools and philosophies of operations research. Tools include: linear programming, Markov chains, queueing theory, and simulation. Other operations research techniques are presented as they relate to the overall systems philosophy.

251. *Analytical Techniques of Operations Research*. 3 hr. PR: IMSE 113 or consent. Nonlinear optimization techniques useful in operations research and industrial engineering studies. Classical optimization techniques, quadratic, geometric, and dynamic programming, branch and bound and gradient techniques.

260. *Human Factors Engineering*. 3 hr. PR: IMSE 113 and IMSE 140 or equiv. Includes the study of ambient environment, human capabilities, and equipment design. Systems design for the man-machine environment interfaces will be studied with emphasis on health, safety, and productivity.

261. *System Safety Engineering*. 3 hr. PR: Consent. The concepts of hazard recognition, evaluation analysis, and the application of engineering design principles to the control of industrial hazards.

277. *Engineering Economy*. 3 hr. Basic concepts of financial analysis investment planning and cost controls as they apply to management technology investment in manufacturing; financial planning and budgeting as applied to an engineering function.

280. *Industrial Engineering Problems*. 1-3 hr. PR: Consent. Special problems.

281. *Computer Applications in Industrial Engineering*. 3 hr. PR: ENGR 2, IMSE 140. Introduction to computer applications in manufacturing. Emphasis on system design and analysis and the role of computers in productivity improvement.

284. *Simulation by Digital Methods*. 3 hr. PR: IMSE 113, 281, or consent. Introduction to Monte Carlo simulation methods and their application to decision problems. Student identifies constraints on problems, collects data for modeling, and develops computer programs to simulate and analyze practical situations. Interpretation of results emphasized.

291. *Design of Production Systems 1*. 3 hr. PR: Senior standing in industrial engineering. The integration of industrial engineering principles in the design of productive systems. Emphasis will be on the analysis of different systems for productivity improvement.

292. *Design of Productive Systems 2*. 3 hr. PR: Senior standing in industrial engineering. Continuation of IMSE 291.

300. *Special Topics in Manufacturing Processes and Automation*. 3 hr. PR: IMSE 200 or equiv. Special topics concerning manufacturing processes and automation with special emphasis on manufacturing management.

302. *Advanced Manufacturing Processes*. 3 hr. PR: IMSE 202 and 203. Metal cutting economic models, solidification processes, bulk deformation, sheet metal and drawing, joining design and economics. Overall view of manufacturing systems. Introduction to numerical control programming and projects on numerical control equipment.

304. *Materials and Processing Systems Design*. 3 hr. PR: IMSE 202 and 203. The engineering design process, material design properties and selection systems, decision making and problem analysis techniques for materials and processing. Economic and cost systems, expert systems, failure analysis and quality systems for materials and process selection.

305. *Computer Integrated Manufacturing*. 3 hr. PR: Graduate standing. Several aspects of computerized manufacturing systems will be covered. Emphasis will be placed on computer fundamentals, computer aided design and manufacturing, numerically controlled (NC) machine tools, part programming, system devices, and direct digital control. 2 hr. lec., 1 hr. lab.

307. *Robotics and Flexible Automation*. 3 hr. PR: Graduate standing. This course will provide an understanding of the principles, capabilities and limitations of industrial robots and other flexible automation tools. Emphasis will be placed on kinematic analysis, trajectory planning, machine vision, and manufacturing automation. 2 hr. lec., 1 hr. lab.

308. *Advanced Problems in Manufacturing Engineering*. 1-3 hr. PR: IMSE 300 or 302; graduate standing. Special problems relating to one of the areas of manufacturing engineering, such as manufacturing processes, robotics, CAD/CAM, group technology, and manufacturing systems engineering.

309. *Computational Methods for Manufacturing Engineers*. II. 3 hr. PR: Graduate standing. Computational techniques applicable to manufacturing systems engineering problems; emphasis on use of personal computers. 2 hr. lec., 1 hr. lab.

314. *Design of Industrial Experiments*. 3 hr. PR: IMSE 214 or consent. Continuation of IMSE 214. More complex experimental design especially useful to engineering and industrial researchers, including factorials and optimum-seeking design. Emphasis on use of existing digital computer routines and interpretation of results.

325. *Engineering Management*. 3 hr. Unique problems of engineering organizations including project planning, managing creativity, coordinating design and development, and other topics relevant to engineering organizations.

338. *Technology Forecasting*. 3 hr. Various procedures used in forecasting technical developments.

340. *Work Analysis*. 3 hr. PR: Consent. Analysis of industrial engineering's involvement in analyzing work situations. Particular emphasis will be given to the use of industrial engineering as a change agent in improving work practices.

342. *Advanced Production Control*. 3 hr. PR: IMSE 250. Different mathematical models useful in the design of effective production control systems. The various models include: static production control models under risk and uncertainty; dynamic models under certainty, under uncertainty, and under risk.

353. *Applied Linear Programming*. 3 hr. PR: IMSE 250 or consent. Application of the assignment, transportation, and simplex algorithms to typical industrial problems. The methods and computational efficiencies of the revised simplex and other algorithms are also studied.

355. *Scheduling and Sequencing Methods*. 3 hr. PR: IMSE 250. Theory and applications of analytical models used in the scheduling of operations. Topics include: single machine scheduling models; flow shop models; job shop models; and assembly line balancing methods.

358. *Special Topics in Systems Analysis and Operations Research*. 3-6 hr. PR: Consent. Special topics from recent developments in operations research and related fields. Special emphasis will be placed on interests of current graduate students.

359. *Operations Research for Public Administrators*. 3 hr. Examination of role of quantitative analysis in public administration and decision-making.

360. *Human Factors System Design*. 3 hr. PR: IMSE 260 or consent. Theoretical aspects and practical applications of man/machine relationships as they influence future system design. The student will examine human limitations with respect to acceptance of information, decision making, and ability to transmit the result of such decisions to controlled equipment systems to obtain design optimization. 2 hr. lec., 3 hr. lab.

361. *Industrial Hygiene Engineering*. 3 hr. Introductory course in industrial hygiene legal standards, historical context, and development. Topics include respiratory physiology, particle size and deposition, ionizing and nonionizing radiation, physical stress, solvents, metals, pesticides, painting, welding, and degreasing.

362. *Systems Safety Engineering*. 3 hr. PR: IMSE 261 or consent. Analysis of manufacturing methods, processes, and properties of materials from a system safety engineering viewpoint. Emphasis will be on hazard analysis techniques (fault tree, MORT, failure modes and effects) and machine guarding methods.

364. *Industrial Ergonomics*. 3 hr. PR: IMSE 260 or consent. Practical experience in the application of ergonomic principles to industrial problems. Safety and production implications of work physiology, industrial biomechanics, and circadian rhythms, as well as current interest topics.

368. *Advanced Problems in Human Factors*. 1-3 hr. PR: IMSE 260 or 360 and graduate standing. Special problems relating to one of the areas of human factors, such as simulation, controls, vigilance, safety, and occupational health.

377. *Advanced Engineering Economy*. 3 hr. PR: Consent. Special emphasis on depreciation, engineering and economic aspects of selection and replacement of equipment; relationship of technical economy to income taxation; effect of borrowed capital and pricing model.

378. *Costing and Estimating for Manufacturing*. I. 3 hr. PR: IMSE 277 or consent. Analysis of overhead, cost indexes, cost capacity factors, improvement curves; costing for materials with design considerations; conceptual cost estimating; costing for machining, joining, casting and forming; facility cost estimation.

381. *Integrated Data Processing*. 3 hr. PR: IMSE 281 and consent. Advanced work in electronic data-processing systems and procedures design. Case studies of integrated data-processing systems. Course projects will include individual use of a computer in management data-processing analysis problems.

451. *Nonlinear Programming*. 3 hr. PR: IMSE 250 or consent. Advanced study of the techniques of nonlinear programming and their applications. Topics include steepest descent, Newton's method, Fletcher-Powell, conjugate gradients, Powell's method, and penalty function methods.

452. *Queueing Theory*. 3 hr. PR: IMSE 113 and 250 or consent. Analytical modeling of waiting line systems with emphasis on determining the best operating conditions for those systems. Single-channel and multichannel models. Computational methods (including Monte Carlo techniques) are examined. Applications to problems such as maintenance and inventory control.

453. *Theory of Linear Programming*. 3 hr. PR: IMSE 250 or consent. Study of procedures available for solving large-scale problems using linear programming. Topics include decomposition techniques, multiple pricing, cycling, inverse generation and storage, ranging procedures, and upper bound algorithms.

454. *Inventory Theory*. 3 hr. PR: IMSE 113 and 250 or consent. Techniques used in optimization of inventory systems. Elements of static, deterministic inventory models, and static, stochastic inventory models. Dynamic inventory models. Selected topics related to inventory analysis.

455. *Probability Theory for Engineers*. 3 hr. PR: IMSE 113 or consent. Probability theory and its application to industrial systems with particular emphasis on inventory, queueing, maintenance, reliability, and quality control systems. Markov processes are covered.

456. *Applied Stochastic Processes*. 3 hr. PR: IMSE 455. Stochastic systems with emphasis on application to inventory and queueing theory. Conditional probability, Poisson processes, counting processes, renewal processes, Markov chains with discrete and continuous parameters.

457. *Dynamic Programming*. 3 hr. PR: IMSE 250 or consent. Introduction to basic structure and computational aspects of dynamic programming and applications including sequential decision problems, deterministic and probabilistic models over finite and infinite planning horizons, and Markovian decision processes.

458. *Integer Programming and Applied Networks*. 3 hr. PR: IMSE 250 or consent. Introduction to application of integer programming and maximum flow networks to engineering and operations research problems. Emphasis on problem formulation and solution.

480. *Seminar*. 1-6 hr. PR: Consent. Discussion of research in industrial engineering and special problems.

484. *Advanced Digital Simulation*. 3 hr. PR: IMSE 284 or consent. Analysis and comparison of special purpose digital simulation languages such as GPSS, SLAM, SIMAN, SIMSCRIPT, CSMP, DYANOMO, and JOB SHOP simulation.

497. *Research*. 1-15 hr.

Occupational Hygiene and Occupational Safety (OHOS)

320. *Foundations of Environmental Health Practice*. I, II, S. 4 hr. PR: Consent. Designed to enable the environmentalist to recognize and identify environmental stresses and the effect of these stresses on man. Topics include occupational health, physical stress, safety, and basic and broad principles of toxicology.

321. *Epidemiology: Principles and Practices*. I, II, S. 3 hr. PR: STAT 311 or equiv. Principles and methods of epidemiology with emphasis on descriptive and analytical epidemiological methods.

325. *Industrial Hygiene Sampling and Analysis*. II. 3 hr. PR: IMSE 361 and consent. Calibration and use of sampling and analytical equipment used by industrial hygienists to evaluate the work environment. Advantages and disadvantages of different equipment under various conditions. Biological monitoring as an evaluation tool.

326. *Safety and Health Measurement and Instrumentation*. S. 3 hr. PR: Consent. Practical experience in setting up industrial hygiene field studies, air sampling, and analysis. Practical experience with safety equipment and instrumentation used in the field and in research. Field trips and case studies exposing students to a variety of industrial processes.

328. *Noise and Ventilation Control Technology*. S. 3 hr. PR: IMSE 361 or consent. The course will demonstrate techniques for the recognition, evaluation, and control of noise and ventilation problems. Students will use monitoring equipment to evaluate situations and perform several design projects.

380. *Internship*. I, II, S. 3-6 hr. (May be repeated.) PR: Consent of committee chairperson and department chairperson. Professional internship providing on-the-job training under supervision of a previously approved environmentalist in settings appropriate to professional objectives.

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

497. *Research*. I, II, S. 1-6 hr.

Mechanical and Aerospace Engineering

Donald W. Lyons, Ph.D., P.E., Chairperson

323 Engineering Sciences Building

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web: <http://www.cemr.wvu.edu/~wwwmae>

Degrees Offered:

Master of Science in Mechanical Engineering

Master of Science in Aerospace Engineering

Master of Science in Engineering with a major in Mechanical or Aerospace Engineering

Doctor of Philosophy in Engineering with a major in Mechanical or Aerospace Engineering

Faculty

Faculty members in the department have extensive industrial and teaching experience and have published widely. Their combined experience helps them assist students in selecting relevant courses and research topics to meet their educational goals. The department has extensive laboratory space in the Engineering Sciences Building and in the Engineering Research Building to provide support for both instructional and research activities. The department has several special laboratories located nearby, which include the engine research center, the wind tunnel laboratory, and the aircraft-flight test hangar at the Morgantown Municipal Airport (Hart Field). Funded research allows the department to maintain up-to-date instrumentation, equipment, and facilities, including computer-controlled data acquisition systems for laboratory use.

Graduate Programs

The objectives of the departmental graduate-level programs are: (1) to provide master's level education for students in or entering the engineering profession and/or (2) to provide an advanced graduate educational experience for students pursuing the doctoral degree. Three master's degrees are offered in the department: the master of science in aerospace engineering (M.S.A.E.), the master of science in mechanical engineering (M.S.M.E.), and the master of science in engineering (M.S.E.) with a major in mechanical engineering or with a major in aerospace engineering. The department also offers the doctor of philosophy (Ph.D.) degree with majors in mechanical engineering and aerospace engineering.

An application package can be obtained from the graduate program director, Department of Mechanical and Aerospace Engineering, West Virginia University, P.O. Box 6106, Morgantown, WV 26506-6106.

Admission to Master's Programs

To be eligible for admission into the M.S.A.E. or M.S.M.E. degree program, a candidate must hold or expect to receive (by the enrollment date) a B.S.A.E. or B.S.M.E. degree from either an accredited ABET curriculum or an internationally recognized program. Candidates with superior academic records in baccalaureate degrees in other engineering fields, mathematics, or science may be eligible for admission into any of the master's programs offered by the department but will normally be required to attain a baccalaureate level of proficiency in certain engineering areas of the department. An engineering technology (non-calculus based) degree is not sufficient qualification for admission into any of the graduate programs offered by the department.

Doctor of Philosophy Program Admission

To be eligible for admission into the doctor of philosophy degree program, a candidate must hold or expect to receive (by the enrollment date) an B.S. degree in some discipline of engineering from an institution which has an ABET accredited undergraduate program in engineering or an internationally recognized program in engineering.

General Admission Requirements

The other requirements for admission into the graduate programs of the department are summarized as follows:

- To be admitted as a regular graduate student, an applicant must have a grade-point average of 3.0 or better (out of a possible 4.0) in all previous college work and must meet all other requirements below.
- The applicant must first submit, to the office of admissions and records of West Virginia University, a completed application, application fee, and transcripts of all college work (directly from the institution) completed.
- Each applicant is required to have three reference letters (using standard forms available from the department) sent directly to the department; at least two of the three references should be from the institution last attended.
- A minimum score of 550 on the TOEFL is required of all applicants from countries where the native language is not English. (This requirement will be waived for applicants who have completed a recent four-year bachelor's degree in the USA.)
- All international applicants who have not received their undergraduate degree in the USA are required to submit GRE general test scores with the engineering subject test score being optional. Minimum levels of 75th percentile (score of 670) on the quantitative part of the test and 60th percentile (score of 560) on the analytical part are required.

Provisional Admission

An applicant not qualifying for the regular graduate student admission status, either due to insufficient grade-point average, incomplete credentials, or inadequate academic background, can be admitted as a provisional student. Requirements for attaining regular student status must be stated in a letter of admission. Provisional students must sign a contract, which lists in detail all requirements to be met for attaining regular student status, no later than their first registration.

All of the degree programs require the student to attain an overall grade-point average of 3.0 or higher in order to meet graduation requirements. The grade-point average is calculated on the basis of courses and excludes credit for research, for which a grade of S is received. A maximum of nine credit hours of the course work can be at the advanced (200) undergraduate-level, dependent upon the program desired by the student and the agreement of his/her advisory and examining committee.

Courses

Only courses with grades of C or higher may be acceptable for graduate credit, although all course work taken will be counted in establishing the student's grade-point average. No more than nine hours of 200-level credit can be counted toward meeting the course work requirements for the M.S. degree. For the Ph. D., even though the absolute minimum set by the College is 18 hours of course work at the 300-level or higher taken at WVU, the actual minimum is set by the student's advisory and examining committee and is based on the student's background and the area of dissertation. No more than 20 percent of the course work for a doctoral degree can be at the 200 level. A minimum of 24 semester hours of research credit at the Ph.D. level is required for dissertation requirements. Two semesters of full-time attendance at the WVU Morgantown campus are necessary to meet residency requirements in the Ph.D. program.

Math Requirements

The Department of Mechanical and Aerospace Engineering requires that the graduate course work include six hours of advanced mathematics for M.S. programs of study and a minimum of six additional hours of mathematics for the Ph.D. programs. A list of approved mathematics courses can be obtained from the graduate program director of the department.

Time Limitations

All requirements for a master's degree must be completed within eight years preceding the student's graduation. Students should petition for admission to candidacy for the degree during the first semester of residency by filing a plan of study approved by his/her advisory and examining committee. A minimum of 30 hours of course work (including research) is required for the degree. Students must pass a final examination administered by their advisory and examining committee before being certified for the degree.

Doctor of Philosophy

The doctorate is a research or performance degree and does not depend on the accumulation of credit hours. The requirements for the degree are: passing of the qualifying examination, admission to candidacy, residency, completion of dissertation research, and defense of a research dissertation. At least one member of the graduate faculty from outside the department is required to serve on the advisory and examining committee.

The Ph.D. degree signifies that the holder has the competence to function independently at the highest level in the chosen field. Hence, the number of years involved in

attaining or retaining competency cannot be readily specified, nor can an exact program of study be defined. The course work taken should be sufficient to broaden the student's background in at least one other area of the department in addition to the major area of study.

Qualifying Exam The Ph.D. qualifying/candidacy examination is the method of assessing whether the student has attained sufficient knowledge of the discipline and supporting fields in order to undertake independent research or practice. Students are required to pass a qualifying examination administered by the department which tests for a minimum level of proficiency expected of all students in a given area. It is expected that students will take the qualifying exam during their first semester of enrollment in the Ph.D. program; however it is required that full-time students pass the qualifying examination no later than the end of the second semester of their Ph.D. program. As the student progresses, his/her advisory and examining committee is charged with evaluating the student's competency in the specific area of study through the evaluation of a dissertation proposal for the research to be completed and the evaluation of the student's plan of study and associated course work. After these requirements are completed, the student is formally admitted to candidacy for the Ph.D. degree. Only at this point can a student be called a doctoral candidate; admission to the graduate program for the purpose of pursuing the Ph.D. is not equivalent to becoming a Ph.D. candidate. Doctoral candidates are allowed no more than five years to complete the remaining degree requirements after admission to candidacy. An extension of time can be obtained only by repeating the qualifying examination and meeting any other requirements specified by the student's committee.

M.S.A.E. Degree

Students wishing to pursue a program leading to an M.S.A.E. degree are required to have a B.S.A.E. or B.S.M.E. from an accredited ABET curriculum or the equivalent. Students with an engineering background other than aerospace or mechanical engineering normally will be required to strengthen their background. Programs of study must comply with the rules and regulations as outlined in the general requirements for graduate work in the College of Engineering and Mineral Resources. The student's program of study is formulated jointly by the student and his/her committee. Normally, a thesis is required of all candidates for the degree of master of science in aerospace engineering.

Course Requirements The plans of study for the M.S.A.E. degree must include six semester hours of advanced mathematics beyond a first course in differential equations and at least 12 semester hours of courses taken from any two areas of the department. The remainder of the course work may consist of other courses from mechanical and aerospace engineering, other departments in the College of Engineering and Mineral Resources, or advanced course work in mathematics, chemistry, and physics. A maximum of six hours of research credit is counted toward degree requirements for thesis work. Students not completing a thesis will be required to include six hours of methods courses in their plans of study.

M.S.M.E. Degree

Students wishing to pursue a program leading to an M.S.M.E. degree are required to have a B.S.M.E. or B.S.A.E. from an accredited ABET curriculum or its equivalent. Students with an engineering background other than mechanical or aerospace engineering normally will be required to strengthen their background.

The plan of study must include at least six hours of advanced mathematics beyond a first course in differential equations, and 12 total hours of courses from at least two

areas of study in mechanical engineering. Students are normally required to write a thesis. On occasion, part-time off-campus students may be given permission to substitute a problem report for a thesis when they can present compelling evidence of equivalent experience. A maximum of six hours of research credit is counted toward meeting degree requirements for the thesis option; a maximum of three hours of research credit is counted for the problem report option. The student's plan of study is formulated jointly with his/her advisory committee based upon the interests and educational goals of the student. Students not completing a thesis will be required to include six hours of methods courses in their programs of study.

M.S.E. Degree

The M.S.E. programs with a major in mechanical engineering or in aerospace engineering are intended for students who wish to pursue graduate work in these areas but do not have an undergraduate degree in either discipline. Students desiring to pursue such a program in the department must meet similar general requirements as for the M.S.A.E. and M.S.M.E. degree programs.

Plan of Study Each plan of study in the M.S.E. program must include six hours of advanced mathematics and nine hours from each of any two academic areas in the department. Students are normally required to write a thesis. On occasion, part-time on-campus students may be given permission to substitute a problem report for a thesis when they can present compelling evidence of equivalent experience. A maximum of six hours of research credit is counted toward meeting degree requirements for the thesis option; a maximum of three hours of research credit is counted for the problem report option. The student's plan of study is formulated jointly with his/her advisory committee based upon the interests and educational goals of the student. Students not completing a thesis will be required to include six hours of methods courses in their plans of study.

Ph.D.

Students intending to pursue a doctoral program in the College of Engineering and Mineral Resources with an emphasis in mechanical or aerospace engineering should have earned a B.S. and an M.S. degree in some discipline of engineering. While it is possible for a student with a B.S. degree to enroll directly in the Ph.D. program, it is very rarely permitted.

The doctoral courses of study are selected to fit the individual interests and objectives of the student, with proper attention given to broadening related areas of study. The research work for the doctoral dissertation may entail a fundamental investigation into a specialized area or a broad and comprehensive program of study.

Academic Areas

Courses in the department are organized under four academic areas: aerodynamics and fluids engineering; solid mechanics, materials and structures; system control and manufacturing and design; and thermal sciences and engineering. Students who are pursuing an advanced degree in either mechanical or aerospace engineering may work in one of these areas. In addition, students may pursue studies leading to a specialization in bioengineering.

Aerodynamics and Fluids

A variety of courses and facilities support graduate research in aerodynamics and fluid mechanics. Laboratories are located in college buildings and remote sites. Flow facilities include instrumented subsonic and supersonic wind tunnels, shock tubes, and several flow loops mainly used for research in gas-solid and density stratified flows.

Available instrumentation includes eight channels of hot wire/film anemometry, two single-component and one three-component, laser Doppler velocimeter (LDV) systems. The department owns well-instrumented V/STOL and Cessna U-206 flight test aircraft housed in hangar facilities at Hart Field. A significant portion of the current activity involves numerical solutions to flow problems and is supported by a computing facility dedicated to graduate research.

Although the faculty background and interests in the areas of aerodynamics and fluid mechanics are broad, recent research has been concentrated on problems in multiphase and density-stratified flows, low-speed aerodynamics, shock phenomena in two-phase systems, flow in microgravity, boundary layer control, and high-speed aerodynamics. These research areas include topics such as fluidized bed combustion, aerosol sampling, flow metering, flow distribution systems, numerical solutions to gas-solid flows, and fluid-particle turbulence interactions, including deposition on solid surfaces. The low-speed aerodynamics work is related to the design of vertical axis wind turbines and STOL airfoils. The research in high-speed aerodynamics deals with viscous-inviscid interactions in transonic, supersonic, and hypersonic flow.

Solid Mechanics, Materials, and Structures

The solid mechanics, materials, and structures (SMMS) area encompasses the theoretical, numerical, and experimental study of solid bodies, from concentration on local behavior of deformable bodies to the global response of structural elements or the motion of rigid bodies. Hence, SMMS students may explore the mechanical behavior of materials in the neighborhood of micro-scale defects such as cracks or investigate the behavior of large-scale bodies such as aerospace structures.

The SMMS faculty carries out basic and applied research related to problems in engineering using state-of-the-art computational and experimental techniques. The areas of research include aeroelasticity, fracture mechanics, nonlinear dynamics and vibrations, composite materials, biomechanics, computational methods such as finite-element and boundary-element, and experimental techniques, including optical methods. Furthermore, in cooperation with the Department of Civil and Environmental Engineering, SMMS students may pursue studies related to civil engineering. A large array of research facilities includes laboratories (materials, structures, vibrations, photomechanics, biomechanics, fracture mechanics, and computer aided engineering), computers (IBM and VAX mainframes, work stations, personal computers, and supercomputers), and shop facilities.

Required Core Courses

Regardless of the chosen specialty, the SMMS student is required to take six hours of courses from a core group consisting of MAE 311, MAE 320, and an introductory FEM course. This requirement may be waived for students who can demonstrate that they possess equivalent knowledge. These courses, combined with the entire plan of study, including research credits, prepares the SMMS student to apply mechanics to modern engineering challenges.

System Control, Design, and Manufacturing

The system control, design, and manufacturing academic area offers instructional and research opportunities for students who want to challenge themselves to attain the expertise required to design or control the behavior of a system in a dynamic environment. Instructional offerings furnish students with a foundation for developing prototype systems and for improving the performance of existing systems. These offerings provide such emphasis as elastodynamic analysis, computerized design, active control in auto-

mated machines, and manufacturing systems engineering.

The research endeavors of its faculty reflect a close association with current industrial-type situations. Faculty have research ongoing in the areas of engine acoustic impedance modeling, the control of energy systems in buildings, concurrent engineering, robotics, artificial intelligence, CAD, process control, microprocessor applications, and computer-aided manufacturing.

Thermal Sciences

The thermal sciences and engineering area encompasses the fields of thermodynamics, combustion, heat transfer, and power and energy systems. Graduate course offerings cover a wide range of topics in this area with applications to both aerospace and mechanical engineering problems. Recent research efforts include topics such as the analysis of fluidized bed combustion, energy analysis of buildings, oscillating jet combustion, alternative fuels testing, internal combustion engine performance and emissions, heat transfer, numerical analysis of thermal systems, deposition on turbine blades, and reactor design.

Research facilities include a high-altitude simulation chamber for ablation and wear studies, a fluidized bed combustion laboratory, thermal analyzers, an electrically-heated, natural convection water facility, Schlieren systems for flows with varying density, recording thermocouple data-acquisition systems, a water reservoir for thermal stratification studies, an engine research laboratory, and an emissions research laboratory.

Bioengineering

The MAE Department, in conjunction with other departments in the College of Engineering and Mineral Resources and the Health Sciences Center, offers a program in bioengineering culminating in master's and Ph.D. degrees. The plan of study for a master's degree requires a minimum of 30 credit hours. This includes at least six hours of bioengineering or medical courses. Students are encouraged to continue toward a Ph.D. by following a plan of study tailored specifically to their research interests. Students whose B.S. degrees are in disciplines other than engineering may be required to complete prerequisite courses.

Areas of research specialization include respiratory and diseased tissue mechanics, orthopedic mechanics, bone growth and fracture, and the application to rehabilitation of computer-aided design and microprocessor-based instrumentation. Research facilities include an aerosol inhalation exposure system, laser-based holographic and moiré interferometric equipment, a lung acoustic impedance measurement system, and modern orthopedic, rehabilitation, and computer research laboratories.

Mechanical and Aerospace Engineering (MAE)

200. *Advanced Mechanics of Materials* 1. 3 hr. PR: MAE 43 or consent. Advanced topics in applied stress analysis: stress concentrations, strain energy, beams, thick-walled cylinders, torsional warping, fracture. 3 hr. lec.

210. *Kinematics*. 3 hr. PR: MAE 130 and MATH 18 or consent. Geometry of constrained motion, kinematics synthesis and design, special linkage. Coupler curves, inflection circle, Euler-Savary equation, cubic of stationary curvature and finite displacement techniques. 3 hr. lec.

215. *Experimental Fluid Dynamics* 2.3 hr. PR: MAE 115. Continuation of MAE 115 with increased emphasis on dynamic measurements. Shock tube/tunnel and subsonic and supersonic measurements. Experiments include optical techniques, heat transfer to models, and viscous flow measurements. Error analysis of test data. 2 hr. lec., 3 hr. lab.

216. *Applied Aerodynamics*. 3 hr. PR: MAE 116. Chord-wise and span-wise airload distribution for plain wings, wings with aerodynamic and geometric twist, wings with deflected flaps, and wings with ailerons deflected. Section induced drag characteristics. 3 hr. lec.

217. *Hypersonic Gas Dynamics*. II. 3 hr. PR: MAE 117 or consent. Hypersonic shock and expansion wave relations; hypersonic inviscid flowfields: approximate and numerical methods, blast wave theory; hypersonic boundary layers and aerodynamic heating. 3 hr lec. (alternate years)

220. *Guided Missile Systems*. 3 hr. PR: MAE 117 and/or Conc.: MAE 150. Design philosophy according to mission requirements. Preliminary configuration and design concepts. Aerodynamic effects on missiles during launch and flight. Ballistic missile trajectories. Stability determination by analog simulation. Performance determination by digital and analog simulation. Control, guidance, and propulsion systems. Operational and reliability considerations. 3 hr. lec.

226. *Mechanics of Composite Materials*. 3 hr. PR: MATH 17, MAE 43. Fundamental methods for structural analysis of fiber reinforced composites-lamination theory and micromechanics. Particularities of composite applications in design and manufacturing of structural components-performance tailoring, failure criteria, environmental effects, joining and processing.

232. *V/STOL Aerodynamics*. 3 hr. PR: MAE 117. Fundamental aerodynamics of V/STOL aircraft. Topics include propeller and rotor theory, helicopter performance, jet flaps, ducted fans, and propeller-wing combinations. 3 hr. lec.

240. *Problems in Thermodynamics*. 3 hr. PR: MAE 141 or consent. Thermodynamic systems with special emphasis on actual processes. Problems presented are designed to strengthen the background of the student in the application of the fundamental thermodynamic concepts. 3 hr. lec.

241. *Flight Mechanics 2*. 3 hr. PR: MAE 146. Fundamental concepts of feedback control system analysis and design. Automatic flight controls, and human pilot plus airframe considered as a closed loop system. Stability augmentation. 3 hr. lec.

242. *Flight Testing*. 3 hr. PR: MAE 146. Applied flight test techniques and instrumentation, calibration methods, determination of static performance characteristics, and introduction to stability and control testing based on flight test of Cessna Super Skywagon airplane. Flight test data analysis and report preparation. 1 hr. lec., 6 hr. lab.

243. *Bioengineering*. 3 hr. PR: MAE 43, PHYS 201 or consent. Introduction to human anatomy and physiology using an engineering systems approach. Gives the engineering student a basic understanding of the human system so that the student may include it as an integral part of the design. 3 hr. lec.

244. *Introduction to Gas Dynamics*. 3 hr. PR: MAE 114 or consent. Fundamentals of gas dynamics, one-dimensional gas dynamics and wave motion, measurement, effect of viscosity and conductivity, and concepts from gas kinetics. 3 hr. lec.

249. *Space Mechanics*. 3 hr. PR: MATH 18, MAE 42. Flight in and beyond the earth's atmosphere by space vehicles. Laws of Kepler and Orbital theory. Energy requirements for satellite and interplanetary travel. Exit from and entry into an atmosphere. 3 hr. lec.

254. *Applications in Heat Transfer*. 3 hr. PR: MAE 158. Application of basic heat transfer theory and digital computation techniques to problems involving heat exchangers, power plants, electronic cooling, manufacturing processes, and environmental problems. 3 hr. lec.

262. *Internal Combustion Engines*. 3 hr. PR: MAE 101 or 141. Thermodynamics of the internal combustion engine; Otto cycle; Diesel cycle, gas turbine cycle, two- and four-cycle engines, fuels, carburetion and fuel injection; combustion; engine performance, supercharging. 3 hr. lec.

264. *Heating, Ventilating, and Air Conditioning*. 3 hr. PR: MAE 141 or consent. Methods and systems of heating, ventilating, and air conditioning of various types of buildings; types of controls and their application. 3 hr. lec.

265. *Aeroelasticity*. 3 hr. PR: MAE 160. Vibrating systems of single degree and multiple degrees of freedom, flutter theory and modes of vibration, torsional divergence, and control reversal. 3 hr. lec.

270. *Microprocessor Applications in Mechanical Engineering*. 3 hr. PR: MAE 181. Fundamentals of programming and interfacing a microprocessor. Hands-on, hardware oriented. Assembly language and BASIC programming. RAM, EPROM, analog to digital and digital to analog converters, stepper motors, encoders, AC devices. Interfacing project required. 3 hr. lec.

275. *Computer-Aided Design: Applications. II*. 3 hr. PR: MAE 132 or 161. CAD fundamentals. User-computer interface and interactive programming for rational design. Computational tools, finite elements and modeling techniques. Interactive graphics, pre-post processor applications. Case studies: conceptual-preliminary-detail iterative design and analysis.

280. *Aerospace Problems*. 1-6 hr. PR: Upper-division and graduate standing.

282. *Engineering Acoustics*. 3 hr. PR: MATH 18 or consent. Theory of sound propagation and transmission. Important industrial noise sources and sound measurement equipment. Noise criteria and control methods. Assessment of noise abatement technology. Laboratory studies and case histories.

284. *Applied Feedback Control*. 3 hr. PR: MAE 122 or consent. Application of automatic control theory. Transfer functions and block diagrams for linear physical systems. Proportional, integral, and derivative controllers. Transient and frequency response using Laplace transformation. 3 hr. lec.

285. *Thesis*. 2-6 hr. PR: Senior standing and consent.

286. *Design of Robotic Systems*. 3 hr. PR: MAE 113 or consent. Mechanical automation design associated with robotic systems, including economic justification and ethics. Geometric choices and controller specifications for programmable manipulators. Workstation strategies such as CNC and CIM for computer-based flexible manufacturing.

290. *Seminar*. 1-6 hr. PR: Junior, senior, or graduate standing, and consent.

291. *Introduction to Research*. 1-3 hr. PR: Senior standing and consent. Methods of organizing theoretical and experimental research. Formulation of problems, project planning, and research proposal preparation.

292. *Research Problems*. 2-6 hr. PR: MAE 291 or consent. Performance of the research project as proposed in MAE 291. Project results are given in written technical reports with conclusions and recommendations.

294. *Special Topics*. 1-6 hr. PR: Junior, senior, or graduate standing, and consent.

299. *Special Problems*. 1-6 hr. PR: Consent.

300. *Seminar*. Credit. Attendance required of all graduate students at scheduled seminars.

301. *Advanced Engineering Acoustics*. 3 hr. PR: MAE 282 or consent. Study of complex sound generation and the propagation, transmission, reflection, and absorption of airborne and structure-borne sound. Coupling of sound and vibration in structures. Acoustical behavior and characteristics of materials, aeroacoustics, and acoustics of combustion systems.

305. *Analytical Methods in Engineering*. 3 hr. PR: Consent. Index notation for determinants, matrices, and quadratic forms; linear vector spaces, linear operators including differential operators; calculus of variations, eigenvalue problems, and boundary value problems.

307. *Nonlinear Analysis in Engineering*. 3 hr. PR: Consent. Special topics in nonlinear analysis of various types of engineering systems. Various numerical approximate, and analytical techniques chosen to suit the needs and interests of advanced graduate students.

311. *Adv Mechanics of Materials*. 3 hr. PR: Consent. Shear flow and shear center; curved beams; unsymmetric bending, energy methods in structural analysis; theories of failure; instability of structures; beams on elastic foundation.

312. *Inelastic Behavior of Eng Materials*. 3 hr. PR: MAE 311 or consent. Characterization and constitutive relations of engineering materials; nonlinear elasticity, plasticity, viscoelasticity and creep; numerical implementation.

315. *Fluid Flow Measurements*. 3 hr. PR: MAE 117 or consent. Principles and measurements of static and dynamic pressures and temperatures, velocity, and Mach number and forces. Optical techniques and photography. Design of experiments. Review of selected papers from the literature. 2 hr. lec., 3 hr. lab.

316. *Energy Methods in Applied Mech*. 3 hr. PR: Consent. Variational principles of mechanics and applications to engineering problems; principles of virtual displacements, minimum potential energy, and complementary energy, Castigliano's theorem, Hamilton's principle. Applications to theory of plates, shells, and stability.

318. *Continuum Mechanics*. 3 hr. PR: MAE 42, 43. Mathematical preliminaries including index notation; analysis of stress; analysis of deformation; fundamental laws, field equations, and constitutive equations; application to fluids and solids.

320. *Theory of Elasticity I*. 3 hr. PR: MAE 132 or 161 or consent. Cartesian tensors; plane stress and plane strain; 2-D problems in Cartesian and polar coordinates; stress and strain in 3-D; general theorems; torsion of noncircular sections.
321. *Fracture Mechanics*. 3 hr. PR: MAE 320. Linear-elastic and elastic-plastic fracture mechanics; fatigue, dynamic, and creep crack growth; fracture mechanics models for composite materials.
322. *Advanced Vibrations*. 3 hr. PR: MAE 122 or consent. Dynamic analysis of multiple degree-of-freedom discrete vibrating systems; Lagrangian formulation; matrix and numerical methods; impact; mechanical transients.
325. *Experimental Stress Analysis*. 3 hr. PR: MAE 132 or 161 or consent. Strain gage techniques and instrumentation; stress analysis using optical methods such as photoelasticity and interferometric techniques; NDE and NDT for problems involving stress analysis. 2 hr. lec., 3 hr. lab.
326. *Adv Mechanics of Composite Materials*. 3 hr. PR: MAE 226 or consent. Manufacturing, testing, and diagnostics of composite materials. Anisotropic plates with cutouts. Inelastic behavior of polymer matrix composites. Analysis of advanced composites such as metal matrix, ceramic matrix, and textile.
330. *Instrumentation in Engineering*. 3 hr. PR: Consent. Theory of instrumentation suitable for measuring rapidly changing force, pressure, strain, temperature, vibration, etc.; computerized acquisition, analysis, and transmission of data; methods of noise reduction. 2 hr. lec., 3 hr. lab.
333. *Advanced Machine Design*. 3 hr. PR: MAE 135 or consent. Design for extreme environments, material selection, lubrication and wear, dynamic loads on cams, gears, and bearings, balancing of multiengines and rotors, electromechanical components.
335. *Adv Kinematics of Mechanisms*. 3 hr. PR: MAE 210 or consent. Analytical synthesis of mechanisms with up to five accuracy points; Burmester curve theory and path curvature theory; force and moment balancing of mechanisms; computer-aided dynamic analysis of mechanisms and inverse dynamic analysis.
340. *Adv Thermodynamics 1*. 3 hr. PR: MAE 141 or 151. First and second laws of thermodynamics with emphasis on entropy production and availability (exergy); Maxwell's relationships and criteria for stability; equations of state and general thermodynamic equations for systems of constant chemical composition.
342. *Adv Thermodynamics 2*. 3 hr. PR: MAE 340 or consent. Thermodynamics of multi-component inert and reacting systems; equilibrium analysis; introduction to irreversible processes involving diffusion and chemical kinetics; application of concepts to heterogeneous systems.
350. *Conduction Heat Transfer*. 3 hr. PR: MAE 158 or consent. Analytical and numerical solutions of steady and non-steady heat conduction problems in one, two, and three dimensional bodies; solution of linearized equations; applications include extended surfaces, moving surfaces, moving heat sources, and instrumentation techniques.

352. *Intermediate Dynamics*. 3 hr. PR: MAE 42. Newtonian and Lagrangian mechanics. Dynamics of discrete systems and rigid bodies analyzed utilizing Newtonian and Lagrangian formulations.

353. *Adv Dynamics*. 3 hr. PR: MAE 352 or consent. Analytical mechanics. Stability of autonomous and nonautonomous systems considered and analytical solutions by perturbation techniques introduced. Hamilton-Jacobi equations developed. Problems involving spacecraft, gyroscopes, and celestial mechanics studied.

354. *Convection Heat Transfer*. 3 hr. PR: MAE 158 or consent. Laminar and turbulent flows in forced and free convection systems; external and internal flows with application to heat exchanger design; introduction to aerodynamic heating.

355. *Radiation Heat Transfer*. 3 hr. PR: MAE 158 or consent. Classical derivation of black body radiation laws; gray body and non-gray analysis; radiant properties of materials, radiant transport analysis, specular-diffuse networks, gas radiation, thermal radiation measurements; analytical, numerical solutions, and study of selected publications. 3 hr. lec.

360. *Fluid Mechanics 1*. 3 hr. PR: MAE 114 or equiv. Advanced dynamics and thermodynamics of fluids. Basic laws of conservation of mass and momentum in differential, vector, and integral forms. Application to internal flows, fluid machinery, and structures.

361. *Dynamics of Viscous Fluids*. 3 hr. PR: Consent. Derivation of and exact solutions for the Navier-Stokes equations; laminar boundary-layer theory, similarity solutions, and integral methods.

363. *Computational Fluid Dynamics*. 3 hr. PR: MAE 361 or equiv. Finite difference methods; convergence and stability; Navier-Stokes equations; discretization methods; grid distribution; solution of difference equations; pressure coupling; application to conduction/convection, boundary layers, and recirculating flows; introduction to general purpose CFD codes.

364. *Turbomachinery*. 3 hr. PR: MAE 140 or consent. Flow problems encountered in design of water, gas, and steam turbines, centrifugal and axial flow pumps and compressors, design parameters.

366. *Gas Dynamics*. 3 hr. PR: MAE 117 or equiv. Nonsteady gas dynamics and shock interactions; compressible flow theory in subsonic, transonic, and supersonic regimes, and their numerical treatment.

368. *Multiphase Flows*. 3 hr. PR: MAE 114. Particle dynamics including particle-particle and particle-surface interactions; fluidized bed concepts; mathematical models and numerical methods as applied to multiphase flows; design and instrumentation pertaining to multiphase units.

375. *Adv Computer Aided Design*. 3 hr. PR: MAE 275 or equiv. Geometric modeling; finite element meshing; design approaches; case studies using CAD principles; projects utilizing state-of-the-art CAD packages. 2 hr. lec., 3 hr. lab.

384. *Feedback Control in Mech Eng*. 3 hr. PR: MAE 122 or consent. Emphasis on design of control systems using classical, frequency domain, and time domain methods;

advanced mathematical modeling of physical systems, compensation, stabilization, pole placement, state estimation; extensive use of computerized design tools, especially Matlab.

386. *Robot Mechanics and Control*. 3 hr. Kinematic and dynamic behavior of industrial robot manipulators; formulation of equations of motion for link joint space and end effector Cartesian space; path planning and trajectory motion control schemes.

394. *Special Topics*. 1-6 hr. PR: Senior or graduate standing.

397. *Master's Degree Research*. 1-12 hr. PR: Graduate standing.

399. *Special Problems*. 1-6 hr. PR: Senior or graduate standing.

412. *Fundamentals of Turbulent Flow*. 3 hr. PR: MAE 361 or consent. Basic experimental data. Application of semi-empirical theories to pipe, jet and boundary layer flow. Turbulent heat and mass transfer. Statistical theory of turbulence and recent applications.

414. *Theory of Elastic Stability*. 3 hr. PR: Consent. Stability of discrete mechanical systems, energy theorems, buckling of beams, beam columns, and frames, torsional buckling, buckling of plates and shells, special topics.

420. *Theory of Elasticity 2*. 3 hr. PR: MAE 320. Complex variable methods, stress couples, nonlinear elasticity, numerical methods, potential methods, boundary value problems, various special topics.

424. *Theory of Plates and Shells*. 3 hr. PR: MAE 311 or consent. Classical and modern theories of plates; dynamic response, nonlinear effects, and exact and approximate solutions of plates; application to rectangular and circular plates; membrane shells; shells with bending stiffness.

425. *Perfect Fluid Theory*. 3 hr. PR: Consent. Conformal mapping including Schwarz-Christoffel and Joukowski transformations. Inviscid flows over airfoils, spheres, cones, wedges, and bodies of revolution. 3 hr. lec.

445. *Hydrodynamic Stability Theory*. 3 hr. PR: MAE 361 or 425 or consent. Response of flow field to disturbances; classical instability mechanisms; inviscid centrifugal instabilities; inviscid parallel shear flow stability; viscous boundary layer stability, the Orr-Sommerfeld equation; Rayleigh-Benard flow; introduction to nonlinear stability theory.

450. *Fundamentals of Combustion*. 3 hr. PR: MAE 141 or 150. Thermodynamics, chemical kinetics, and diffusion of reacting gases; laminar and turbulent flames; flame stability and ignition.

484. *Advanced Topics in Control Theory*. 3 hr. PR: MAE 384 or 241. State feedback through eigenstructure assignment; Observers and Kalman filters; multiple-model adaptive estimation and control; parameter estimation; direct and indirect model-reference adaptive-control algorithms; introduction to neural networks.

491. *Advanced Study*. 1-6 hr. PR: Consent. Advanced study in areas not covered by formal courses.

497. *Research*. 1-15 hr. PR: Graduate standing. Ph.D. dissertation research.

499. *Graduate Colloquium*. 1-6 hr. PR: Consent. For graduate students not seeking course work credit but who wish to meet residence requirements, use University facilities, and participate in its academic and cultural programs.

Mining Engineering

Syd S. Peng, Ph.D., Chairperson

365A Mineral Resources Building

Degree Offered:

Master of Science in Engineering of Mines, Doctor of Philosophy in Mineral Engineering

Master of Science in Engineering of Mines (M.S.E.M.)

Students desiring to take courses for graduate credit at the master's level in the College of Engineering and Mineral Resources must first apply for admission and state a major field.

Applicants with a baccalaureate degree from institutions other than WVU in mining engineering will be admitted on the same basis as graduates of WVU. Lacking these qualifications, the applicant must first fulfill the requirements of the Department of Mining Engineering.

Academic Standards

Each student will, with the approval of the student's graduate committee—appointed with the consent of the student within the first semester of registration—follow a planned program. The program contains a minimum of 24 hours of course work and six hours of independent and original study in mining engineering leading to a master's thesis. At least 60 percent of the course credits must be from 300-level or 400-level courses while the remainder can be made up of 200-level courses.

Approval for candidacy for a graduate degree by faculty action is required to establish eligibility for a degree. A graduate student may request approval by formal application after completing a minimum of 12 semester hours of graduate courses with a grade-point average of at least 3.0 (B), based on all graduate courses in residence for which final grades have been recorded.

No credits are acceptable toward an advanced degree which are reported with a grade lower than C. To qualify for an advanced degree, a student must have a grade-point average of at least 3.0, based on all courses completed in residence for each graduate credit. Each candidate for a degree must select a major subject and submit a thesis showing independent, original study in mining engineering.

Doctor of Philosophy in Mineral Engineering (Ph.D.)

The principal objective of the doctor of philosophy program in mineral engineering is the education and training of graduates so that they are capable of attaining the highest levels in the mineral engineering profession and performing the professional roles of developing and improving the efficient extraction of solid mineral resources. The two areas of specialization are mine systems, and rock mechanics and ground control.

All applicants must have earned a M.S. degree in Mining Engineering with a GPA of 3.5 or higher. The Graduate Record Examination (GRE) is required, and the applicant must have scored in the 75th percentile or higher for quantitative analysis. For all foreign applicants whose native language is not English, a TOEFL test score of 550 or better is required. In addition, each applicant is required to submit at least three letters of recommendation, one of which must be from the applicant's previous thesis advisor or an academic equivalent. All letters of recommendation should evaluate the student's potential for performing independent doctoral-level research.

The Ph.D. program in mineral engineering consists of 54 hours of course work and 36 hours of independent research beyond a bachelor's degree in mining engineering. The successful completion of a qualifying examination and an approved dissertation are also required.

Engineering of Mines (E M)

204. *Mining Methods for Vein Deposits*. I. 3 hr. PR: M 2, GEOL 151, MATH 16. Methods and systems of mining other than flat seams. Emphasis on selection of methods in relation to cohesive strength of ore bodies and their enclosing wall rocks. Mining of anthracite included.

205. *Coal Mining*. I. 3 hr. PR: Junior standing or consent. (Not open to mining engineering students.) Introduction to elements of coal mining.

206. *Mining Exploration and Evaluation*. I. 3 hr. PR: GEOL 151 and STAT 101. Methods and procedures for mineral reconnaissance and exploration; geological considerations, various prospecting and exploration techniques, reserve estimation, and engineering economy.

207. *Longwall Mining*. II. 3 hr. PR: E M 105. Elements of longwall mining including panel layout and design considerations, strata mechanics, powered supports, coal cutting by shearer or plow, conveyor transportation, and face move.

211. *Rock Mechanics and Ground Control*. I. 4 hr. PR: E M 105, 106, MAE 41, 43, GEOL 151. Rock properties and behavior, in situ stress field, mine layout and geological effects; design of entry, pillar, and bolt system, convergence and stress measurements, surface subsidence, roof control plan, slope stability, and laboratory sessions.

214. *Rock Mechanics*. I. 3 hr. PR: MAE 43 or consent. Elastic and plastic properties of rock, Mohr's criteria of failure, elastic theory, stress distributions around underground openings, open pit and underground stability, rock testing techniques.

224. *Special Subjects for Mining Engineering*. I, II. 1-6 hr. PR: Senior or graduate standing or consent. Special problems in mining engineering, including choices among operations research, mine systems analysis, coal and mineral preparation, and coal science and technology.

231. *Mine Environmental Engineering*. II. 3 hr. PR: E M 105, MAE 114; PR or CONC: MAE 101. Engineering principles, purposes, methods, and equipment applied to the underground environmental control including ventilation, illumination, and dust and noise control.

242. *Mine Health and Safety*. II. 3 hr. PR: E M 105, 106. The nature of the federal and state laws pertaining to coal mine health and safety; emphasis will be placed on achieving compliance through effective mine planning, design, and mine health and safety management.

243. *Industrial Safety Engineering*. I. 3 hr. PR: Junior standing or consent. Problems of industrial safety and accident prevention, laws pertaining to industrial safety and health, compensation plans and laws, and industrial property protection.

271. *Mine and Safety Management*. I. 3 hr. PR: E M 105, 106, and 206. Economic, governmental, social, regulatory, cost, labor, environmental, and safety aspects of mining as related to the management of a mining enterprise.

276. *Mine and Mineral Reserve Valuation*. I. 3 hr. PR: Senior standing. Methods used to value mineral properties; factors affecting value of mineral properties.

286. *Fire Control Engineering*. II. 3-4 hr. PR: Senior standing. Aspects involved in the control from fire, explosion, and other related hazards. Protective considerations in building design and construction. Fire and explosive protection organization including fire detection and control. 3 lec. and/or 3 hr. lab.

287. *Applied Geophysics for Mining Engineers*. I. 3 hr. PR: E M 105, 106, PHYS 12, GEOL 151 or consent. Origin of the universe and the planets, heat and age of the earth. Application of the science of geophysics in the location and analysis of earthquakes and in prospecting for oil and minerals.

291. *Mine Plant Design*. II. 3 hr. PR: Senior standing. Layout, analysis and detailing of the major mine installations, and support facilities. Locations include: the surface plant, shaft and slope stations, section centers. Systems dealt with are bulk handling, power, ventilation, supplies, water, and personnel.

295. *Mine Systems Design*. I. 3 hr. PR: E M 105, 106, consent. Each student selects and designs a mine subsystem under specified conditions, including extraction, transportation, ventilation, roof control, exploration, plant design, surface facilities, etc. 2 hr. lec., 1 hr. lab.

296. *Mine Design*. II. 4 hr. PR: Senior standing, final semester. Comprehensive design problem involving underground mining developments, surface plant or both, as selected by the student in consultation with instructor. Preparation of a complete report on the problem required, including drawings, specifications, and cost analysis.

311. *Advanced Ground Control—Coal Mines*. I, II. 3 hr. PR: E M 211 or consent. Ground and strata control for underground and surface coal mining, including slope stability and subsidence.

312. *Surface Subsidence Engineering*. II. 3 hr. PR: E M 211. Elements of surface subsidence engineering due to underground mining: theories of surface subsidence, characteristics and prediction of surface movements, and effects of surface movements.

316. *Advanced Rock Mechanics*. I. 3 hr. PR: E M 214 or consent. Testing techniques and interpretation, strength and fracture, classification, anisotropy, friction, jointed rock, fluid pressure, fragmentation, and excavation.

320. *Mobile Excavating and Materials Handling*. I. 3 hr. PR: Graduate standing and consent. Mobile mining equipment will be systematically analyzed as to functional, production, failure, and operational aspects. Included will be routine and innovative methods, and surface and underground applications, such as the hydraulic shovel and impactors.

321. *Integrated Excavating and Materials Handling*. II. 3 hr. PR: Graduate standing and consent. Integrated mining equipment will be systematically analyzed as to functional,

production, failure, and operational aspects. Included will be routine and innovative methods, and surface and underground applications, such as the longwalls and monorails.

331. *Mine Ventilation Network Analysis*. II. 3 hr. PR: E M 231, M. 281, or consent. Theory and computational techniques for mine ventilation network problems with emphasis on computer-aided analysis of complex mine ventilation systems.

332. *Advanced Mine Ventilation*. II. 3 hr. PR: E M 231. Advanced topics in mine atmospheric control including control of methane, dust, humidity, and heat. Also covers leakage characteristics, fan selection, analysis of ventilation networks, and planning of mine ventilation system.

342. *Advanced Mine Health and Safety*. I. 3 hr. PR: E M 242 or graduate standing. Special emphasis will be placed on mine rescue, mine disaster prevention and organization, and mine property and equipment loss prevention.

351. *Explosive Engineering Design*. II. 3 hr. PR: E M 251 or consent. Rock drilling, total blast systems simulation, experimental studies in blast design, rock fracturing, chemical thermodynamics, kinetics, and reaction rates.

365. *Deterministic Methods for Mineral Engineers*. I. 3 hr. PR: Graduate standing or consent. Analysis and solution of mineral engineering problems which require use of deterministic models. Application of deterministic methods to mineral transportation, mineral resource allocation and extraction problems, and mine planning and equipment utilization problems.

366. *Stochastic Methods for Mineral Engineers*. II. 3 hr. PR: Graduate standing or consent. Application of stochastic methods to mineral engineering problems in equipment selection, renewal processes, mine ventilation, mine production, and mineral extraction.

371. *Mine Production and Cost Management*. I, II. 3 hr. PR: M 281, EM 271. Planning manpower and material requirements for different mining methods, forecasting productivity from production sections, analysis of mine cost components, scheduling and control of mine operations, integrated optimization of mine cost and productivity.

391. *Advanced Mine Design*. I, II. 1-6 hr. PR: Graduate standing or consent. Advanced detail design and layout of coal mine plant, particularly incorporating new ideas of machines and mining methods.

394. *Special Topics*. I, II, S. 1-3 hr. PR: Graduate standing or consent. Selected field of study in mining engineering.

397. *Master's Degree Research or Thesis*. I, II, S. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

398. *Advanced Mine Design 1*. 1-6 hr. PR: EM 296. Detailed design of the components of coal mine subsystems including ground control, excavation and handling, and life support subsystems. 1-6 hr. lec..

399. *Advanced Mine Design 2*. 1-6 hr. PR: E M 296. Examination of the broad aspects of mine design for non-coal deposits. Consideration of deposits of various shapes, materials and qualities including country rock. Comparison of principles established for coal mine design. 1-6 hr. lec..

411. *Theories of Surface Subsidence*. 3 hr. PR: EM 312. Theories of surface subsidence due to underground coal mining including empirical, profile function, theoretical and physical modeling methods, and time factors. 3 hr. lec.

412. *Theory of Pillar Design*. 3 hr. PR: EM 211 and 311. Examination of various theories of pillar design for room and pillar design for room and pillar mining and longwall mining including chain pillars, barrier pillars and bleeder pillars.

416. *Theory of Rock Failure*. I. 3 hr. PR: EM 214 or consent. Friction, elasticity, strength of rock, mechanism of brittle failure, factors affecting failure process, theories of failure, fracture propagation in rock, fracture toughness of rock and coal, fluid pressure, size, stress gradient, and time-dependent effects.

417. *Laboratory and Field Instrumentation*. I. 3 hr. PR: EM 211, 214, or consent. Principles and applications of strain gages and photoelasticity for stress analysis in rock/coal; displacement/velocity gages and accelerometer for ground motion; holography and acoustic emission for nondestructive tests.

418. *Rock Mechanics in Mine Design*. II. 3 hr. PR: EM 211, 214, or consent. Design process in mining engineering; design approaches for excavations in rock; input parameters for design; empirical, observational, and analytical methods of design; integrated designs. 1 hr. lec., 2 hr. lab.

431. *Mine Ventilation Network Optimization*. I. 3 hr. PR: EM 331 or consent. Application of mathematical optimization techniques to mine ventilation network problems, including linear and nonlinear optimization for controlled-flow and generalized networks.

451. *Theory of High Explosives*. II. 3 hr. PR: E M 351 or consent. The application of chemical thermodynamics and the hydrodynamic theory to determine properties of high explosives, chemical equilibria and calculation of detonation and explosion-state variables.

465. *Optimization Applications in Mining*. 3 hr. PR: Graduate Standing and EM 367. Detailed study and use of optimization techniques to solve mining problems, including programming techniques for large-scale linear, mixed-integer and 0-1, dynamic, nonlinear, and heuristic programming.

469. *Expert Systems in Mining*. II. 3 hr. PR: Graduate standing. An overview of expert systems applications in mining, a detailed study of two mining applications, study of shells and their components, and study of a specific shell used to develop a project.

491. *Advanced Topics*. I, II, S. 1-6 hr. PR: Advanced graduate standing, consent. Selected field of study in mining engineering.

492. *Directed Study*. I, II, S. 1-6 hr. PR: Advanced graduate standing or consent. Directed study, reading, and/or research.

493. *Special Topics*. I, II, S. 1-6 hr. PR: Advanced graduate standing or consent. Contemporary topics selected from recent developments in mining engineering.

494. *Special Seminars*. I, II, S. 1-6 hr. PR: Advanced graduate standing or consent. Special seminars for advanced graduate students.

495. *Independent Study*. I, II, S. 1-6 hr. PR: Advanced graduate standing or consent. Faculty supervised study of topics not available through regular course offerings.

496. *Graduate Seminar*. I, II, 1 hr. PR: Consent. It is anticipated that each graduate student will present at least one seminar to the assembled faculty and graduate student body of the student's program.

497. *Research*. I, II, S. 1-15 hr.

499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking course work credit but who wish to meet residence requirements, use the University's facilities, and participate in its academic and cultural programs.

Petroleum and Natural Gas Engineering

Samuel Ameri, P.E., M.S. in Petroleum Engineering, Chairperson

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Degree Offered:

Master of Science in Petroleum and Natural Gas Engineering

A student desiring to take courses for graduate credit at the master's level in the College of Engineering and Mineral Resources must first apply for admission and state the major field.

An applicant with a baccalaureate degree or its equivalent in petroleum or natural gas engineering from another institution will be admitted on the same basis as graduates of WVU. Lacking these qualifications, the applicant must first fulfill the CEMR requirements of the Department of Petroleum and Natural Gas Engineering.

Academic Standards

Each student will, with the approval of the student's graduate committee—appointed with the consent of the student within the first semester of registration—follow a planned program. The program contains a minimum of 24 hours of course work and six hours of independent and original study in the petroleum and natural gas engineering field leading to a master's thesis or 30 hours of course work and three hours of independent study leading to a comprehensive problem report. At least 60 percent of the course credits must be from 300- or 400-level courses while the remainder can be made up of 200-level courses.

Degree Candidacy

Approval for candidacy for a graduate degree by faculty action is required to establish eligibility for a degree. A graduate student may request approval by formal application after completing a minimum of 12 semester hours of graduate courses with a grade-point average of at least 3.0, based on all graduate courses in residence for which final grades have been recorded.

Advanced Degree

No credits which are reported with a grade lower than C are acceptable toward an advanced degree. To qualify for an advanced degree, a graduate must have a grade-point average of at least 3.0 based on all courses completed in residence for graduate

credit. Each candidate for a degree must select a major subject and submit a thesis showing independent, original study in petroleum engineering.

Each degree candidate is required to take PNGE 496.

Petroleum and Natural Gas Engineering (PNGE)

205. *Transport Phenomena in Petroleum Engineering*. II 3 hr. PR: MAE 41. Introduction to fluid flow in pipes, two-phase flow, rotary drilling hydraulics, primary cementing jobs, flow calculations, flow measuring devices, fluid machinery, dimensional analysis, and heat transfer.

210. *Drilling Engineering*. II. 4 hr. PR or Conc.: GEOL 1, MAE 114. Rock properties, functions and design considerations of rotating system, hoisting system, and circulation system; drilling fluids calculations and selections; hydraulic programs; drilling optimization; casing and casing string design; cementing programs; and pressure control.

211. *Production Engineering*. I. 3 hr. PR: PNGE 210. Well completion, performance of productive formation, drill stem tests, completion of wells, flowing wells, gas lift methods and equipment, pumping installation design, well stimulation, emulsion, treating, gathering and storage of oil and gas, field automation. 3 hr. lec.

212. *Drilling Fluids Laboratory*. I, II. 1 hr. PR or Conc.: PNGE 210, MAE 114. Topics include clay hydration, viscosity of water-based fluids, mud weight control, filtration studies, thinning agents, chemical contaminants, lime muds, polymer muds, rheological models, and liquid and solid determination.

224. *Petroleum Engineering Problems*. I, II, S. 1-3 hr. PR: Senior standing. Investigation of a special problem in petroleum engineering.

225. *Petroleum Engineering Ethics*. II. 1 hr. PR: Senior Standing. Introduction to petroleum and natural engineering ethics and moral issues concerning safety in engineering practice as well as those arising for engineers employed by corporations. Professionalism and professional registration.

232. *Petroleum Properties and Phase Behavior*. I. 3 hr. PR or Conc.: CHEM 141 or consent. Theoretical and applied phase behavior of hydrocarbon systems and hydrocarbon fluid properties. Applications to petroleum reservoir and production engineering design. 2 hr. lec., 3 hr. lab.

233. *Elements of Petroleum Reservoir Engineering*. II. 3 hr. PR: PNGE 232 or consent. Basic properties of petroleum reservoir rocks. Fluid flow through porous materials. Evaluation of oil and gas reserves.

234. *Applied Petroleum Reservoir Engineering*. I. 3 hr. PR: PNGE 233 or consent. Application of reservoir engineering data to calculation of recovery potentials and to analysis, simulation and prediction of reservoir performance under a variety of production methods to effect maximum conservation.

235. *Formation Evaluation*. I, II. 3 hr. PR: PNGE 210 or consent. Various well logging methods and related calculations with exercises in interpretation of data from actual well logs. 3 hr. lec.

241. *Oil and Gas Property Evaluation*. I. 3 hr. PR: PNGE 233; PR or Conc.: PNGE 211 and 235; or consent. Reserve estimation, decline analysis, petroleum property evaluation including interest calculations, cost estimation and tax evaluation. Overview investment decision analysis and computer applications in property evaluation.
244. *Petroleum Reservoir Engineering Laboratory*. I, II. 1 hr. PR or Conc.: PNGE 233. Laboratory evaluation of basic and special petroleum reservoir rock properties. 3 hr. lab.
262. *Introduction to Reservoir Simulation*. II. 3 hr. PR: M 281, PNGE 234 or consent. Partial differential equations for fluid flow in porous media and the use of finite-difference equations in solving reservoir flow problems for various boundary conditions. Study of individual well pressures and fundamentals of history matching.
270. *Natural Gas Engineering*. I. 4 hr. PR: PNGE 205 or MAE 114; PNGE 233; and MAE 101; or consent. Natural gas properties, compression, transmission, processing, and application of reservoir engineering principles to predict the performance and design of gas, gas-condensate, and storage reservoirs. Includes a laboratory devoted to gas measurements. 3 hr. lec., 3 hr. lab.
271. *Natural Gas Production and Storage*. II. 3 hr. PR: PNGE 270. Development of gas and gas-condensate reservoirs; design and development of gas storage fields in depleted gas, gas-condensate, oil reservoirs and aquifers; design of natural gas production and processing equipment.
295. *Petroleum Engineering Design*. II. 3 hr. PR: PNGE 211, 234, 241; or consent. Comprehensive problems in design involving systems in oil and gas production, field processing, transportation, and storage.
299. *Well Stimulation Design*. II. 3 hr. PR: MAE 43, PNGE 210, 211, 233, and 235; or consent. Fundamentals of well stimulation and treatment design and their applications to low permeability formations.
302. *Fluid Flow in Porous Media*. I. 3 hr. PR: PNGE 234, MATH 18 or consent. Theoretical and practical aspects of the physical principles of hydrodynamics in porous media. 3 hr. lec.
340. *Secondary Recovery of Oil by Water Flooding*. I. 3 hr. PR: PNGE 233. Theory of immiscible fluid displacement mechanism, evaluation and economics of water flood projects, and oil field flooding techniques. 3 hr. lec.
343. *Advanced Secondary Recovery*. II. 3 hr. PR: PNGE 340. Secondary recovery of oil by gas flooding, miscible fluid injection, *in situ* combustion, and heat injection. 3 hr. lec.
362. *Reservoir Simulation and Modeling*. II. 3 hr. PR: PNGE 262 or consent. Application of finite-difference equations to multi-phase fluid flow in porous media in two or three dimensions with gravity and capillary pressure effects. Simulation of waterflood performance and enhanced recovery techniques.
384. *Pressure Transient Analysis*. II. 3 hr. PR: PNGE 234 or consent. Methods of analysis of pressure transient data obtained from well testing for the purpose of determining *in-situ* reservoir conditions including porosity, lateral extent, average reservoir pressure, and formation permeability.

394. *Special Topics*. I, II, S. 1-6 hr. PR: Consent. Selected fields of study in petroleum and natural gas engineering.

397. *Master's Degree Research or Thesis*. I, II, S. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

496. *Graduate Seminar*. I. 1 hr. PR: Consent. Individual study and oral presentation of selected topics in petroleum engineering. Current petroleum literature and research are discussed.

497. *Research*. I, II, S. 1-15 hr.

Safety and Environmental Management

Daniel E. Della-Giustina, Ph.D., Chairperson

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Degree Offered:

Master of Science

A concentration or major in safety management at the master's and postmaster's degree level provides an opportunity for individuals to elect courses and related experiences aimed at developing competencies needed by traffic safety educators, occupational safety managers, or school safety coordinators. Baccalaureate degree programs from which students are usually admitted include: business management, engineering, technology education, physical education, physical science, psychology, sociology and anthropology, or safety, provided that a 2.75 grade-point average has been achieved. Otherwise, admission must be of provisional status, which requires the students to earn a 3.0 average during the first 12 semester hours.

Safety and Environmental Management (SEM)

(NOTE: Enrollment in all SEM courses by permit only)

291. *Special Topics*. 2-6 hr. PR: Consent. Consideration of persistent issues and changing problems in the safety field. Seminar emphasis extends considerable attention to safety interests of participating class members.

301. *Safety Function Management Integration*. 3 hr. PR: Consent. Consideration of integrated arrangements, common constraints, developmental level, essential guidelines, staff liaison, project improvement, effectiveness audits, and collaboration needed to assure success of the safety function.

303. *Risk Counteractant Resource Preparedness*. 3 hr. PR: Consent. Counteraction of risk involving deficient resource preparedness by emphasizing problems delineation, ergonomic adjustments, work-task analyses, performance standards, quality supervision, essential training and pertinent management techniques.

310. *Controlling Environmental and Personnel Hazards*. 3 hr. PR: SEM 300 or consent. Investigation of hazard control principles relating to environmental facilities and equipment including control procedures recommended by authorities from the fields of engineering, medicine, and public health as well as from the field of safety.

331. *Safety in Motor Transportation Services*. 3 hr. PR: SEM 131 or consent. (May not be taken for both undergraduate and graduate credit.) Safety elements of automotive transportation including design, operation, planning, control, and effects of legislation.

332. *Safety Education Principles and Content*. 3 hr. PR: SEM 131 or consent. Study and analysis of content areas usually recommended for instructional programs within the field of safety, with emphasis on structured learning experiences.

333. *Disaster Preparedness and Emergency Systems*. 3 hr. Major elements involved in disasters and emergencies, preparedness planning, systems utilization, and attention to essential human services, with emphasis on community action.

334. *Establishing and Managing Fire Services*. 3 hr. Analysis of fire services usually provided under safety manager jurisdiction, with special attention to legal bases, organizational structure, services rendered, training needs and management techniques.

335. *Safety Legislation and Compliance Operations*. 3 hr. PR: SEM 300 or consent. Comprehensive study and analysis of federal and state legislation which mandates compliance with certain safety conditions and practices related to work performed in occupational and comparable settings.

339. *Security Management Practices and Problems*. 3 hr. Safety manager responsibilities for security of persons and property including organizational patterns, personnel competencies expected, surveillance and monitoring Methods, and occupational problems among security personnel.

340. *Instrumentation for Safety Managers*. 3 hr. PR: Consent. Anticipation, recognition, evaluation of industrial hygiene topics encountered by safety managers. Fundamental instrumentation techniques are presented in laboratory and lecture formats. Management-oriented control and remediation programs are developed.

357. *Alcohol Safety Programs*. 3 hr. (May not be taken for both undergraduate and graduate credit.) Safety programming in schools, community, and the workplace. Approaches, programs, and materials are examined for use at the local level. Scientific reports are studied to determine the effectiveness of various approaches. 3 hr. lec.

358. *Substance Abuse in the Workplace*. II. 3 hr. PR: Consent. The problem, nature, and effects of drug/alcohol use in the workplace; approaches for treatment and avoidance such as EAP's, community programs, and testing; development of management approaches and programs.

361. *Loss Initiating Adversities Remediation*. 3 hr. Perception of adversities tolerated as an extension of uncontrolled hazardous exposure with remediation concentrated upon identification, confirmation, and correction services including utilization of specialist personnel.

363. *Disabled Enterprise Resources Restoration*. 3 hr. PR: Consent. Examination of management guidelines, reporting procedures, insurance variations, rehabilitation and restoration efforts, and recovery procedures needed to successfully restrain losses attributed to disabled enterprise resources.

364. *Identifying and Correcting Disabled Resources*. 3 hr. PR: Departmental Consent. Hazard recognition and reporting; examination of insurance variations, counseling, rehabilitation, and recovery of efforts; employing remediation and correction services; using specialists; establishing liaisons; developing evaluation methods and control of loss-producing situations involving people and property.

391. *Advanced Topics*. 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

397. *Master's Degree Research or Thesis*. I, II, S. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

418. *Safety, Measurement, Evaluation, and Research*. 3 hr. PR: SEM 300. Analysis of evaluative data and statistical procedures applicable to the safety field plus investigation of the nature and purposes of research dealing with safety and accident prevention with emphasis on human and environmental factors.

452. *Manpower Development for Safety Responsibilities*. 3 hr. PR: Graduate standing in safety studies and consent. Safety manpower positions, needs and problems in relation to efforts by business, industrial, governmental and educational agencies to provide sufficiently effective professional and subprofessional preparation of safety practitioners.

459. *Directed Study*. 1-6 hr. PR: Doctoral level standing and consent. (Required of all candidates for doctoral degrees in safety studies.) Analysis of research designs and procedures for compilation, organization, treatment, and interpretation of data for safety research projects.

460. *Biomechanics of Safety Management*. 3 hr. PR: Departmental Consent. Applying the laws of physics to describe the abilities and limitations of the human body biomechanically and physiologically in order to maintain safety, quality, and productivity objectives; based on safety management principles.

468. *Essential Safety Management Information*. 3 hr. PR: Consent. Examination of information needed for safety management success, harm investigation procedures, evaluation techniques, nonrealized profit calculations, and decision-making which should enhance improvement of all safety function affairs.

472. *Practicum*. 1-6 hr. PR: Graduate standing in safety studies and consent. Individual and/or group experiences in development, implementation, and participation in special projects involving safety education, safety services, and environmental safety in schools, colleges, or communities.

490. *Teaching Practicum*. 3-15 hr.

491. *Advanced Study*. 1-16 hr.

497. *Research*. 1-15 hr.

College of Human Resources and Education

Jane H. Applegate, Ph.D., Dean

Ernest R. Goeres, Ph.D., Associate Dean for Research and Development

Richard D. Hawthorne, Ph.D., Associate Dean for Academic Affairs

John O. Andes, Ed.D., Coordinator, Off-Campus Programs and Graduate Services

Graduate Programs

Education	Ed.D.
Counseling	M.A.
Educational Leadership Studies	M.A.
Educational Psychology	M.A.
Elementary Education	M.A.
Reading	M.A.
Rehabilitation Counseling	M.S.
Secondary Education	M.A.
Special Education	M.A.
Speech Pathology and Audiology	M.S.
Technology Education	M.A.

The College of Human Resources and Education, located in Allen Hall on the Evansdale Campus, offers graduate level programs of study in counseling, counseling psychology, rehabilitation counseling, special education, speech pathology and audiology, curriculum and instruction, educational leadership, elementary education, reading, secondary education, education foundations, educational psychology, and technology education. Thesis programs are devoted to the study and development of human talent and resources in the school, family, and community. Instruction, research, and extended service are carried out in close cooperation with related departments and units of the university.

Doctoral Program

If you would like additional information about the graduate programs in the College of Human Resources and Education, please contact the chairperson of the department most relevant to your program interests. Students in the doctor of education (Ed.D.) program may elect an area of emphasis in counseling psychology, curriculum and instruction, educational leadership, educational psychology, reading, special education, or technology education. Specific information about doctoral studies in these emphasis areas is listed in the program description area of the catalog.

Admission Admission, curriculum, and degree requirements of the various degree programs of the College of Human Resources and Education are provided in each program section in this catalog. It is the responsibility of the student to take steps to insure that he or she is properly informed of the degree requirements and/or the certification standards being sought. Since certification requirements are changed from time by the state, the fulfillment of certification requirements as presented in this catalog can not guarantee compliance with current requirements. Students are therefore encouraged to seek the counsel of members of the faculty, their advisors, and the college certification officer on matters pertaining to degree and certification requirements.

All applicants for admission to the doctoral program in the College of Human Resources and Education must submit their scores on the aptitude test of the Graduate Record Examination and/or the Miller Analogies Test, three letters of recommendation, a current vita, a statement of long-range and short-range goals, and their reasons for selecting WVU as the institution for matriculation. Applicants to HR&E must comply with

the general University graduate study regulations. Personal interviews are required by several programs. Additional information may be required by the faculty of a specific area of emphasis prior to program admission.

Committee Formation After admission to a specific program, the student, in consultation with the advisor, selects a chairperson and four committee members to serve as his or her doctoral committee. This committee must be approved by the department chair, and the dean of the college. The doctoral committee must meet the following minimum standards:

- The doctoral committee must be composed of a minimum of five members, the majority of whom must be regular members of the graduate faculty.
- The student's major advisor must be from the student's major program area and must be a regular member of the graduate faculty. No more than two other members of the doctoral committee may be from the student's major program area of study.
- At least two members of the doctoral committee must be from the student's major program area of study.
- At least one member of the doctoral committee must be from the student's minor program area of study.
- The doctoral committee must include at least one member from outside the student's program area, and that individual must have knowledge and insights relevant to the student's program of study.
- No more than one member of the doctoral committee may be a nonmember of the graduate faculty.
- At least three members of the doctoral committee must be members of the graduate faculty of the College of Human Resources and Education.

Program Plan The final determination of the program of course work and research is the responsibility of the student's doctoral committee. The doctor of education degree is not awarded on the basis of the completion of any set number of credits, but is awarded on the basis of demonstrated academic achievement and scholarly competence. Seventy-two semester hours of relevant graduate work, excluding dissertation credit, but including credits of relevant graduate work completed at the master's degree level, constitutes the minimum course work acceptable. The doctoral program must include course work in three areas: major, minor, and foundations, and the program requirements in each area must be met.

Candidacy The purposes of the admission to candidacy examination are to assess the quality of the student's academic achievement, to review the student's program of course work, to approve a proposed outline of dissertation research, and to admit the student to formal candidacy for the doctoral degree. The student and the committee at the time of program planning will identify competencies to be developed and how they will be assessed. These will be stated in the student's individual program. The doctoral student and his or her doctoral committee will determine when the student is ready for assessment of competencies. The examination will be prepared and assessed by the student's doctoral committee and will address all work in the doctoral program plan of the student. The chairperson will notify the student and the student records office, who will notify all appropriate University and college offices of the outcome. Upon successful completion of the admission to candidacy examination, and the acceptance by the committee of the dissertation prospectus, the student will be admitted to formal candidacy for the doctoral degree.

Prospectus The candidate must submit and justify a prospectus for a doctoral dissertation as a portion of the admission to candidacy examination. The doctoral committee

must review and *approve*, *approve with change*, or *reject* the outline or prospectus. The student must consult with all members of the doctoral committee and with other appropriate members of the University faculty during the dissertation phase of the program.

Final Oral Examinations The student will be admitted to the final oral examination upon completion of the dissertation and after fulfilling all other requirements set by the committee. The examination will be conducted by the student's doctoral committee and the publicized meeting will be open to all members of the University faculty. If the student receives more than one unfavorable vote from the doctoral committee, the candidate will not be recommended for the doctoral degree.

Time Limitation If the student should fail to complete an approved dissertation within five years after being admitted to candidacy, he or she must repeat the admission to candidacy examination and any other requirements specified by the student's doctoral committee. A student must satisfactorily complete a minimum of nine semester hours of approved graduate credit in each of two consecutive terms in residence.

All graduate students are admitted in one of the three University classifications and are responsible for making a formal request for change of status.

Master of Science Degree

Three options are generally available in HR&E's master's programs; the student should refer to the specific program to determine the option that applies.

Master's degree programs are offered in counseling, rehabilitation counseling, speech pathology and audiology, education administration, educational psychology, elementary education, reading, secondary education, special education, and technology education.

A. At least 30 semester hours of course work, including six semester hours of research.

B. At least 30 semester hours of course work, including three semester hours of research, selected in conference with the candidate's committee, directed by the advisor, with final approval by the committee, and 27 semester hours of course work.

C. At least 36 semester hours of approved course work.

- The student must comply with specific graduate requirements of the University, the College of Human Resources and Education, and the program.

- All students will be assigned an advisor. Two additional faculty members will be assigned to serve as the remainder of the three-member master's committee.

- No student may be awarded a master's degree unless the student has a minimum grade-point average of 3.0 on all work taken for the graduate degree. (A grade of less than C does not carry credit toward a graduate degree, but counts in determining the grade-point average.)

- No student will be permitted to repeat a required graduate course more than once.

- Many programs require the comprehensive examination in options A, B, and C above. The candidate's committee will determine whether the examination will be oral or written or both. Within the first two weeks of the semester in which the student intends to take the final master's degree examination, he or she must submit to the appropriate department chair an application to take the examination. A student must have completed a minimum of 27 semester hours of approved course work before taking the comprehensive examination. In addition, a student must have achieved a 3.0 grade-point average of all work taken for graduate credit before applying to take the comprehensive examination.

Second Examinations A candidate who fails the final master's degree examination may, upon written consent of the student's advisory committee, be given a second examination not earlier than the following session or semester. A candidate who fails the second

examination and desires a third opportunity to complete program requirements may meet, at the committee's discretion, to determine remediation recommendation before the third and final attempt at the examination. The third examination may be given no earlier than one calendar year from the second examination. If the student fails the third comprehensive examination, the student will be removed from the degree program.

Time Limit All requirements must be completed within eight years immediately preceding the awarding of the degree.

Non-Degree Status

Students who fail to meet the specific requirements of the sections dealing with admission, grade-point average, course repeats, transfer credits, comprehensive examinations, or special written requirements specified by the program will not be admitted to or will be terminated from the degree program. Students not admitted to or terminated from a degree program may apply in writing for classification as a non-degree graduate student to the appropriate department chair or the Office of Student Advising and Records of the College of Human Resources and Education, (P.O. Box 6122, Morgantown, WV 26506-6122.) Non-degree classification would allow the student to take course work for certificate renewal, certification, or personal interest; this course work is not applicable for a degree in the program.

Students may obtain additional information about a particular graduate program by writing to the coordinator of that program or by writing the Dean, College of Human Resources and Education, West Virginia University, P.O. Box 6122, Morgantown, WV 26506-6122.

Graduate Faculty

† Indicates regular member of graduate faculty.

* Indicates associate member of graduate faculty.

Counseling, Rehabilitation Counseling, and Counseling Psychology Professors

†L. Sherilyn Cormier, Ph.D. (Purdue U.). Counseling Psychology. Counseling psychology training and clinical supervision models, Advanced psychotherapeutic techniques.

*James DeLo, Ph.D. (U. Pitt.). Counseling, Coordinator, off-campus counseling programs. Field work coordinator, Adult development.

†Ranjit K. Majumder, Ph.D. (U. Okla.). Rehabilitation Psychology, Rehabilitation counseling.

†Robert P. Marinelli, Ed.D. (Penn. St. U.). Coordinator, Master's Degree Program in Rehabilitation Counseling. Rehabilitation counseling and psychology, vocational counseling and psychology, Ethical issues in counseling psychology and rehabilitation.

†Robert L. Masson, Ed.D. (SUNY). Rehabilitation. Group counseling.

†Jeffrey K. Messing, Ed.D. (Syracuse U.). Counseling. Rehabilitation and Counseling Psychology Chairperson, Counseling Psychology, Vocational psychology, Consulting models, Program design, Conflict resolution and mediation.

†David J. Srebalus, Ed.D. (Ind. U.). Counseling Psychology. Vocational psychology, Career counseling, Counseling and psychotherapy theories.

†Roy H. Tunick, Ed.D. (U. N. Colo.) Rehabilitation psychology, Counseling psychology, Psychological and vocational assessment, Vocational psychology, Psychology of disability, Mental health rehabilitation, Adolescents in crisis.

†Michael T. Yura, Ph.D. (Ohio St. U.). Counseling. Child play therapy, Handicapped children, Vocational development.

Associate Professors

*Kathryn B. Greever, Ed.D. (WVU). Rehabilitation. Grant development.

†Edward E. Jacobs, Ph.D. (Fla. St. U.). Counseling. Creative counseling, Group counseling, Marriage and family, Impact therapy.

†Cynthia R. Koladner, Ph.D. (Penn. St. U.). Director of Training, Doctoral program in counseling psychology, Counseling psychology research and professional issues. Eating disorders, Feminist/cognitive behavioral theory.

Assistant Professor

*Elizabeth Iglesias, Ed.D. (Penn. St. U.). Cross-cultural counseling and gender issues, Career counseling.

Curriculum and Instruction

Professors

†Jane H. Applegate, Ph.D. (Ohio St. U.). Dean. Teacher education.

*John L. Carline, Ph.D. (Syracuse U.). *Emeritus*.

J. William Douglas, Ph.D. (Ohio St. U.). Management theory, History and philosophy of sport.

Marilyn Fairbanks, Ed.D. (WVU). *Emeritus*.

†Richard D. Hawthorne, Ph.D. (U. Wisc.). Associate Dean. Academic Affairs, Curriculum development, Professional development, School reform.

†Boyd D. Holtan, Ed.D. (U. Illinois). Mathematics education, Instructional strategies, Microcomputer education.

†Ronald V. Iannone, Ed.D. (Syracuse U.). Creative drama, Aesthetic education, Alternative education.

Robert L. Kurucz, Ph.D. (Ohio St. U.). Adjunct. Sport and exercise study, Exercise physiology.

Layle D. Lawrence, Ph.D. (LSU). Adjunct. Secondary agricultural education, Youth organization, Extension education.

†Roy A. Moxley, Ph.D. (U. Mich.). Early childhood education, Early literacy, Educational technology.

*C. Kenneth Murray, Ph.D. (Ohio St. U.). Social studies education, Economic education, Teacher education.

†Patricia A. Obenauf, Ed.D. (U. Va.). Curriculum development, Science education, Conceptual models.

†W. Michael Reed, Ed.D. (VPI & SU). Director, Microcomputer Lab, English education, Hypermedia, Software development.

†R. Jerrald Shive, Ed.D. (U. Ill.). Chairperson. Curriculum, Foundations of education, Social studies education, Equity in education.

†Patricia K. Smith, Ed.D. (WVU). *Emeritus*.

†Charles Wales, Ph.D. (Purdue U.). Adjunct. Thinking skills, Decision making and guided design.

Associate Professors

*W. Scott Bower, Ph.D. (Ohio St. U.). Teaching strategies, Curriculum development, Teacher effectiveness.

†Ardeth M. Deay, Ph.D. (Cornell U.). Classroom organization and management, Rural women in education, Peace education.

Stacy A. Gartin, Ph.D. (Ohio St. U.). Adult agricultural education, Communications, Leadership development.

†Jeanne Gerlach, Ed.D. (WVU). English education, Writing as learning, Collaborative writing.

†Mary E. Haas, Ed.D. (Ind. U.). Social studies education, Geographic education, Global education.

†Perry D. Phillips, Ed.D. (WVU). Social studies education, Teacher education.

†Steven D. Rinehart, Ed.D. (WVU). Reading education, Language arts, Teacher education.

†Randall L. Wiesenmayer, Ph.D. (Penn. St. U.). Science education, Science/technology/society (STS) education, Environmental education.

Assistant Professors

Judy Abbott, Ph.D. (U. Tx). Literacy education, Children's writing, Motivation, Children's literature.

Michael A. Caruso, M.A. (WVU). Teacher education certification.

*Nancy Hoffman, Ed.D. (Penn. St. U.). Supervision, Staff development, Effective teaching.

Barbara Mertins, M.S.L.S. (Syracuse U.). Bibliographic instruction, Children's literature, School librarianship.

Kerry S. Odell, Ph.D. (Ohio St. U.). Adjunct. Research methodology, Microcomputer applications, Teaching methods.

Eric Pyle, Ph.D. (U. of Ga.). Science education, Motivation/social cognition, Earth science education, Research methodology.

James Rye, Ph.D. (Penn. St. U.). Science concept learning; Science/technology/society education, Human nutrition and health education.

- *Joy F. Saab, Ed.D. (WVU). Early childhood, Creative arts, Foxfire.
- *Carolyn Walker, Ed.D. (Purdue U.). Literacy, Language arts education.
- *Judy A. Werner, Ph.D. (U. S. Carolina). Mathematics education, Teacher education.

Education Foundations

Professors

- Franklin Parker, Ed.D. (G. Peabody TC). *Emeritus*.
- Thomas J. LaBelle, Ph.D. (UNM). Non-formal education in Latin America, Anthropology and education, Ethnic studies and multiculturalism.
- Mary I. Yeazell, Ed.D. (U. Ill.). *Emerita*.

Associate Professor

- Esther E. Gottlieb, Ph.D. (U. Pitt.). Adjunct. Comparative and international education, Qualitative research methodology, Teacher education.

Assistant Professors

- *Van O. Dempsey, III, Ph.D. (UNC). Sociology of education, Social foundations of education, Qualitative research methodology.
- *Samuel F. Stack, Jr., Ph.D. (USC). History, Philosophy and sociology of education, Educational theory.
- Jaci Webb-Dempsey, Ph.D. (UNC). Adjunct. Qualitative research and evaluation methodology, Social contexts of learning, Educational policy and school reform.

Educational Psychology

Professors

- Benjamin H. Bailey, Ed.D. (U. Fla.). *Emeritus*.
- *Lawrence Fraley, Jr., Ed.D. (USC). Conceptual Foundations of behaviorology, The science of human behavior applied to instructional development and teaching.
- *Daniel E. Hursh, Ph.D. (U. Kans.). Developmental and child psychology, instructional and environmental design. Language development.
- *Rogers McAvoy, Ph.D. (Ind. U.). Education, Learning, Instruction.
- *Anne H. Nardi, Ph.D. (WVU). Chairperson. Developmental psychology, Problem solving, Adult learning.
- *John J. Paterson, Ed.D. (Mich. St. U.). Administrative and educational services, Educational statistics and measurement.
- *W. Michael Reed, Ed.D. (VPI & SU). Adjunct. Microcomputer research, Writing research, Cognition and writing.
- Meng Shu Tseng, Ed.D. (Ind. U.) *Emeritus*.
- *Ernest A. Vargas, Ph.D. (U. Pitt.). Behaviorology, instructional design, Verbal behavior.
- *Julie S. Vargas, Ph.D. (U. Pitt.). Instructional design, Behavioral analysis, Microcomputers, Verbal behavior.
- *Richard T. Walls, Ph.D. (Penn. St. U.). Educational psychology, Human learning, Problem solving, Vocational rehabilitation.

Associate Professors

- *Floyd L. Stead, Ed.D. (WVU). Education, Educational measurement, evaluation, and research.

Assistant Professors

- Thomas M. Bell, Ph.D. (W. Mich. U.). Adjunct. Behavioral assessment, Behavior management, Quantitative analysis, Instructional systems.
- *Rayne S. Dennison, Ph.D. (U. Neb.-Lincoln). Cognitive development, Metacognition, Learner strategies.
- *Carol S. Kamin, Ed.D. (U. Houston). Problem based learning, Instructional design, Multimedia development.
- Susan M. Rodman, Ed.D. (WVU). Adjunct. Computer and information systems, Statistical methods.
- *Floyd K. Russell, Ed.D. (WVU). Adjunct. Computer based instruction, Hypertext, Multimedia, Distance learning, Instructional design.

Educational Leadership Studies

Professors

- †John Andes, Ed.D. (U. Fla.). Interim Chairperson. Higher education law, Administration and leadership.
- †Ronald Childress, Ed.D. (U. Tenn.). WV Graduate College. Instructional management.
- †Ernest R. Goeres, Ph.D. (U. Iowa). Associate Dean. Higher education finance, College business management, Economics of higher education.
- †Richard A. Hartnett, Ed.D. (WVU). Comparative higher education, Administrative theory, Academic governance, Collective bargaining.
- †Paul A. Leary, Ph.D. (U. Mass.). WV Graduate College. Public school administration.
- James A. Martin, Ed.D. (U. Tenn.) Superintendency, Finance, Law.
- †Caroline Neal, Ed.D. (WVU). WV Graduate College. Social foundations, Public school administration.
- †James Ranson, Ph.D. (Ohio St. U.). WV Graduate College. Secondary education, Education research.
- Ermel Stepp, Ed.D. (WVU). Marshall U. Administrative theory, Leadership, Computers.
- Powell Toth, Ph.D. (Ohio St.) WV Graduate College. Public school administration.
- †Jack E. Yeager, Ed.D. (VPI & SU). WV Graduate College. Higher education law, Politics of education, Public school administration.
- †Ken M. Young, Ed.D. (VPI & SU). WV Graduate College. School principalship, Public school administration.

Associate Professors

- †Billy K. Gordon, Ed.D. (U. Ky.). Marshall U. Supervision, General school administration.
- *JoAnn Hall, Ed.D. (VPI & SU). WV Graduate College. Supervision, Public school administration.
- †Helen M. Hazi, Ph.D. (U. Pitt.). Legal issues affecting instructional supervision.
- †Aimee A. Howley, Ed.D. (WVU). Marshall U. School reform, Supervision.
- †Michael Sullivan, Ed.D. (WVU). WV Graduate College. Organization and administration.

Assistant Professors

- *Nell C. Bailey, Ed.D. (Ind. U.). Marshall U. Personnel administration, Higher education.
- †Phyllis Durden, Ed.D. (U. of Wash.). Public school leadership, assessment, and evaluation, Politics of education.
- †David P. McBreen, Ph.D. (Cornell U.). Higher and continuing education administration.

Adjunct Teaching and field Practice Resource Personnel

- Shannon Rae Bennett, Ed.D. (WVU). Adjunct. Supervisor, Randolph County Schools.
- Sharon Z. Brisbin, Ed.D. (WVU). Adjunct. Teacher, Harrison County Schools.
- Harold C. Carl, II, Ed.D. (WVU). Adjunct. Superintendent, Pleasants County Schools.
- Martha D. Dean, Ed.D. (WVU). Adjunct. Superintendent, Wetzel County Schools.
- D. Lyn Dotson, J. D. (WVU). Adjunct. Vice President for Development, WVU Foundation, Inc.
- Jack C. Dulaney, Ed.D. (WVU). Adjunct. Superintendent and Secretary of the Monongalia County Board of Education.
- Linda S. Dunn, Ed.D. (Va. Tech.). Adjunct. President, WV Northern Community College.
- Sharon D. Harsh, Ed.D. (WVU). Adjunct. Assistant Superintendent of Schools, Barbour County Schools.
- Kenneth E. Kelly, Ed.D. (Geo. Wash. U.). Adjunct. Vice President for Student Affairs and Associate Professor Management, Fairmont State College.
- Scott C. Kelley, Ed.D. (Harvard U.). Adjunct. Vice President Administration and Finance, WVU.
- Richard H. Martin, Ed.D. (WVU). Adjunct. Principal, Frazier High School, Perryopolis, Pennsylvania.
- Florita S. Montgomery, Ed.D. (WVU). Adjunct. Extension Associate Professor and Extension Communications Specialist, WVU Extension Service.
- Robert N. Moore, Ph.D. (U. Rochester), Ed.D. (WVU). Adjunct. Extension Associate Professor and Extension Communications Specialist, WVU Extension Service.
- Joseph A. Paull, Ed.D. (WVU). Adjunct. Assistant Executive Director, RESA VII.
- P. William Rosier, Ed.D. (WVU). Adjunct. Retired Public School Administrator.
- Edward W. Shirley, Ed.D. (WVU). Adjunct. High School Principal, Rockville, Maryland.
- Thomas S. Sloane, Ph.D. (Ohio St. U.). Adjunct. Assistant Dean, Student Life. College student, Student development.

Douglas C. Smith, Ph.D. (Penn. St. U.). Adjunct. Program Coordinator, Off-Campus Credit, Shepherdstown, WV.

Gary G. Smith, Ed.D. (WVU). Adjunct. Principal, Clay-Battelle High School.

Special Education

Professors

†Thomas P. Lombardi, Ed.D. (U. Ariz.). Learning disabilities, Mental retardation.

†Barbara L. Ludlow, Ed.D. (WVU). Severe/multiple disabilities, Clinical supervision, Early intervention.

Gabriel A. Nardi, Ph.D. (U. Wisc.). Behavior disorders, Mental retardation.

†Wilfred D. Wienke, Ed.D. (U. N. Colo.). Chairperson. Professional development, Mental retardation, Research.

Associate Professors

†Diane T. Woodrum, Ed.D. (WVU). Mental retardation, Behavior disorders, Learning disabilities.

Assistant Professors

†Gretchen Butera, Ph.D. (UC at Santa Barbara). Early intervention, Clinical Supervision.

Elizabeth Dooley, Ed.D. (WVU). Learning disabilities, Behavior disorders, Minority concerns.

Kevin A. Koury, Ed. D. (WVU). Learning disabilities, Clinical supervision.

Instructor

Cheryl L. Wienke, M.S. (U. N. Colo.). Clinical. Clinical supervision.

Lecturers

Gia S. Deasy, M.A. (WVU). Behavior disorders, Clinical supervision.

Joan M. Henderson, M. A. (WVU). Learning disabilities, Clinical supervision.

Christine M. Toscano-Nixon, M. A. (WVU). Behavior disorders, Clinical supervision.

Steven K. Pavlovic, M. A. (WVU). Early intervention, Clinical supervision.

*Judy Werner, M.A. (Newark). Gifted, Technology in special education.

Speech Pathology and Audiology

Professors

†Carolyn P. Atkins, Ed.D. (WVU). Speech Pathology. Speech improvement, Clinical supervision.

†Mary Ellen Tekieli Koay, Ph.D. (U. Okla.). Speech Pathology. Cleft palate, Neurophysiology, Neuropathologies, Clinical supervision.

†Norman J. Lass, Ph.D. (Purdue U.). Speech Pathology. Speech perception, Speech acoustics.

†Dennis M. Ruscello, Ph.D. (U. Ariz.). Speech Pathology. Phonogy, Cranio facial anomalies, Clinical supervision.

†Kenneth O. St. Louis, Ph.D. (U. Minn.). Speech Pathology. Fluency, Voice, Clinical supervision.

†Charles M. Woodford, Ph.D. (Syracuse U.). Audiology. Audiological evaluation, Industrial and environmental audiology, Clinical supervision.

Associate Professors

†Conrad Lundeen, Ph.D. (U. Iowa). Chairperson. Audiology. Aural rehabilitation, Central auditory disorders.

†Linda I. Shuster, Ph.D. (Ohio St. U.). Speech Pathology. Aphasia, Speech perception.

Assistant Professors

Lynn R. Cartwright, Ed.D. (WVU). Speech Pathology. Parent involvement, Clinical supervision.

Kate R. Franklin, Ph.D. (U. Nebraska). Speech Pathology. Public school programs, Augmentative communication.

Karen Barr Haines, M.S. (WVU). Clinical. Speech Pathology. Augmentative communication, Clinical supervision.

Robin R. Jones, M.S. (WVU). Audiology. Aural rehabilitation, Clinical supervision.

Cheryl L. Prichard, M.S. (WVU). Speech Pathology. Public school clinical programs, Rural education, Clinical supervision.

Technology Education

Professors

Paul W. DeVore, Ph.D. (Penn. St. U.). *Emeritus*.

†David L. McCrory, Ph.D. (Case West. Res. U.). Chairperson. Curriculum studies/evaluation, Technology transfer, Professional development.

†Edward C. Pytlik, Ph.D. (Iowa St. U.). Technology education, Production systems, International development.

Associate Professor

†George R. Maughan, Jr., Ed.D. (WVU). Technology education, Communication/information systems, Microcomputers. Curriculum development.

Assistant Professor

†John Wells, Ph.D. (Va. Tech.). Technology education, Biotechnical systems, Curriculum development.

Counseling

Jeffrey K. Messing, Department Chairperson

502 Allen Hall

P.O. Box 6122

Degree Offered:

**Master of Arts; Area of Emphasis for Doctorate of Education is
Counseling Psychology**

Master of Arts in Counseling

The Department of Counseling, Rehabilitation Counseling, and Counseling Psychology of the College of Human Resources and Education offers a master's program in counseling. The counseling M.A. program is fully accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP). Variations in the curriculum allow emphasis in school counseling and community agency/mental health counseling. All candidates for the master of arts in counseling enroll for a common departmental core during the first semester of study. Selection of an area for concentration is made at the beginning of the second semester; this area governs the choice of courses for the balance of the graduate program. All applicants must comply with University requirements, the College of Human Resources and Education requirements, and departmental requirements.

Students are encouraged to pursue their studies on a full-time basis; however, part-time students are accepted. Counseling programs are available for both full-time and part-time students. An active summer program is available for part-time students. There are no summer practicum or internship placements.

Required Courses All students who are candidates for a master's in counseling are required to take the following core courses:

- COUN 301 *Counseling Techniques*
- COUN 305 *Theory and Practice of Human Appraisal*
- ED P 320 *Introduction to Educational Research*
- COUN 306 *Counseling Theories*
- COUN 308 *Organization of School Guidance Services**
- COUN 309 *Group Counseling Theory & Techniques*
- COUN 320 *Lifespan Career Counseling*
- COUN 322 *Community Counseling*
- COUN 330 *Counseling Children*
- COUN 332 *Counseling Adolescents and Adults*
- COUN 334 *Cultural Issues*
- COUN 340 *Addictions Counseling*
- COUN 345 *Couples and Family Counseling*
- COUN 385 *Practicum*
- COUN 386 *Counseling Internship*

Application Applications for admission to the counseling program should be made to West Virginia University, Office of Admissions and Records. In addition to the admission requirements of the University and the College of Human Resources and Education, the Department of Counseling, Rehabilitation Counseling, and Counseling Psychology has the following admission requirements.

- A baccalaureate degree with course work in appropriate areas.
- A minimum undergraduate grade-point average of 2.8, based on a 4.0 system.
- GRE scores—a recommended total score of 1,000.
- Three letters of reference.
- Completion of the application to the counseling program.

The initial screening decision is based upon this information. Successful applicants are then interviewed by program faculty. Final decisions about admission are based on both the requirements and the interview process. Of the two steps in the process, the grade-point average and interpersonal skills demonstrated during the interview have the greatest input into the admission decision process.

Admission The West Virginia University Counseling Department's admission process is a two-step procedure. Step 1 is a review of paper credentials including references, department application (relevant major, general quality of application), work experience, GRE scores, and GPA.

Step 2 is the department interview, which considers interpersonal style relevant to working as a counselor, communication skills, capacity for empathic understanding and communication, ability to articulate professional goals, goals congruent with department focus, knowledge and understanding of counseling, assessment of applicants' capacity to complete the counseling curriculum successfully.

Application deadline for summer and fall admission is March 15; deadline for spring admission is October 15.

Counseling provides a broad opportunity to work with children at the elementary-school level, adolescents at the secondary-school level, and adults in community agencies. The school counselor is involved in personal counseling, career guidance, vocational and educational counseling, family counseling, and consultation on classroom problems with teachers and administrators. Counselors must be equipped to work with both individuals and groups. Much of the school counselor's work is carried out in classrooms with teachers and students. The school counselor also is active in working with community agencies.

Degree Requirements Degree requirements include completion of the required counseling course work, including practicum and internship. A minimum of 48 hours of course work with a 3.0 grade-point average is required.

In addition to completing all course work and the practicum and internship satisfactorily, the candidate must demonstrate the ability to assume the responsibility required of a professional counselor and the personal characteristics and ethical standards essential to effective working relationships with others.

These personal characteristics are assessed during the clinical course work components of the program and during the field experience. Students who do not meet professional and clinical standards in these areas are provided feedback, and resources for remediation are recommended. In these cases, successful remediation is required as a prerequisite for successful program completion. Students who violate ACA ethical standards will be evaluated for possible dismissal from the program.

In reviewing the curriculum available in counseling, the applicant will note that much of the course work provides the background applicable for employment in general community agency work. Some graduates who do not take employment directly in school settings find opportunities as counselors in the fields of public welfare, mental health, drug and alcohol counseling, and corrections.

Seminars All students enrolled in the master of arts in counseling program are expected to attend continuing education/professional development training seminars. These seminars or workshops must be related to counseling. The counseling program will provide many of these activities. Students should check with their assigned advisor for seminar information.

Certification

Certification requirements in school counseling are the same as for the masters of arts in counseling, except as noted below:

- A minimum grade-point average of 3.0.
- Recommendation of the faculty.
- A valid professional teaching certificate at the level for which counseling and guidance endorsement is desired, or the completion of a nine-hour block of professional education course work and competency assessment in addition to the 48-hour master's degree program.
- Completion of the required pattern of certification courses. (Contact the department for this list.)
- Specialization area examination. Satisfactory performance is required for certification eligibility. This examination is administered under the auspices of the State Department of Education.

Doctor of Education

All applicants must comply with the graduate requirements of the College of Human Resources and Education and the program of counseling psychology. The program includes course work hours in addition to the College of Human Resources and Education requirements for the Ed.D. degree.

The area of specialization for the doctoral degree is oriented primarily toward training practitioners/scientists who have a substantial background in the philosophy and methods of psychology as a comprehensive science. Students are expected to work closely with faculty in doing research and in supervised therapy practice. Successful completion of the program requires core coursework in counseling psychology, as well as in clinical psychology, statistics and research, and supervised practice. The program is fully accredited by the American Psychological Association (APA).

Admission The admission process is a two-stage procedure. Each spring, applications received by January 15th are reviewed for admission to the next academic year.

Applicants are screened based on written information and credentials provided to the admissions committee, including the following:

- Completion of a master's degree in an area related to counseling psychology.
- Graduate grade-point average of 3.5, verified by official transcripts of graduate course work.
- Three letters of recommendation to support applicant's competency in counseling, testing, research, and personal qualities of readiness for completion of a doctoral degree.
- A recommended total score of at least 1,000 on the Graduate Record Examination.
- Two years of relevant work experience is desirable.

Those persons who are successful in the Stage I process are invited to campus for

a personal interview with the program faculty. The personal interview is required for a final admission decision. The interview helps to determine the applicant's interpersonal and clinical skills, which are predictive of success in graduate study, internship, and post-degree placement.

Announcements regarding admission are made on or before April 15. Materials received after January 15th are not reviewed until the following year, unless space is available.

Candidacy Students are accepted for study toward the Ed.D. degree upon admission into the programs. Requirements for doctoral candidacy are the following:

- Completion of prerequisite doctoral coursework with a 3.25 grade-point average.
- A written comprehensive examination of major areas in counseling psychology and research.
- Completion of an approved research prospectus.

Internship After admission to candidacy, students are eligible to enroll in internship. The internship is a full-time calendar year in an off-campus APA accredited training site approved by the director of training. After successful completion of the internship and the research dissertation, students take a final oral examination regarding their dissertation research.

Curriculum and Instruction

Doctor of Education

The curriculum and instruction area of specialization for the doctoral degree is designed to prepare candidates to teach at college or university levels, work with school districts or other agencies in curriculum areas, or to hold leadership positions in organizations that emphasize teaching and learning. Program flexibility allows candidates to design programs that meet their career goals. All programs are approved by an advisor and faculty committee.

The program requires a minimum of 72 hours beyond the baccalaureate degree, including 42 hours beyond a master's degree. In addition, the completion of a major in curriculum and instruction, a minor in a supporting area, a core of foundations and research courses, successful completion of a comprehensive examination, and an approved dissertation are mandatory.

Admission All applicants must comply with the requirements of WVU, the College of Human Resources and Education, and the Curriculum and Instruction emphasis area program. Entrance requirements for the Curriculum and Instruction area of entrance for the Ed.D. are as follows:

- Completion of a master's degree; preferably in a curriculum or instruction area.
- Graduate grade-point average of 3.25 or higher.
- The extent to which the applicant's goal may be accomplished through the program.
- Favorable recommendations and appropriate background experiences.
- Total GRE score (verbal plus quantitative) of 1,000 or higher, or a MAT score of 50 or higher. International students from a country in which English is not the native language must have a TOEFL score of at least 550.
- A satisfactory writing sample.

Applications are reviewed and admission recommendations are made by the Department's Doctoral Admissions Committee. The number of students accepted into the program in each admission period is determined by available resources.

Candidacy Students are accepted for study toward the Ed.D. with an emphasis in curriculum and instruction upon admission into the program. To advance to candidacy for the doctorate, the student must:

- Complete prerequisite doctoral program coursework with at least a 3.0 grade-point average.
- Pass a written comprehensive examination, and
- Have a research prospectus approved by his or her dissertation committee.

Inquiries

Inquiries should be addressed to the Chair of Curriculum and Instruction, 602 Allen Hall, College of Human Resources and Education, West Virginia University, P.O. Box 6122, Morgantown, WV 26506-6122 or by phone (304) 293-3441.

Counseling (COUN)

216. *Behavior Problems and the School*. II, 3 hr. A course primarily oriented toward assisting educators utilize current psychological principles related to classroom discipline, as well as academic and social adjustment.

283. *Workshop in Counseling and Guidance*. I, II, S. 1-12 hr. PR: Consent. To take care of credits for special workshops and short intensive limit courses on methods, supervision, and other special topics.

301. *Counseling Techniques*. I, II, S. 3 hr. PR: Consent. Development and application of basic counseling skills including interviewing, clinical observation, and a general orientation to counseling settings. Evaluation will be based on strengths and deficits in intra- and interpersonal skills and on demonstration of counseling skills in checkout situations. In-setting laboratory experience required.

305. *Theory and Practice of Human Appraisal*. I, II, S. 3 hr. An overview of standardized evaluation methods commonly utilized in educational and rehabilitation settings. Experience is provided in selection, administration, and interpretation of selected instruments.

306. *Counseling Theories*. II, S. 3 hr. PR: COUN 301 and consent. A study of counseling approaches commonly used in public schools, colleges, and rehabilitation agencies. Application of theory emphasized.

308. *Organization/Development: School Guidance Services*. I, S. 3 hr. PR: COUN 305, 306, 320, and consent. Design and conduct of a school needs assessment, development of an annual guidance program, and review of current professional legal issues.

309. *Group Counseling Theory and Techniques*. I, II, S. 3 hr. PR: COUN 306 and consent. Theories of group counseling and demonstrations of specific group techniques. Evaluation will be based on expertise in group facilitation.

320. *Lifespan Career Counseling*. II, S. 3 hr. PR: COUN 305. Principles and methods involved in career counseling with diverse populations. Emphasis on theories of career development and life-style planning, career choices, and lifelong work adjustment.

322. *Community Counseling*. II, S. 3 hr. PR: COUN 301, 306 or conc. enrollment in 306, 320 or consent. Roles and functions of the community agency counselor; cognitive skills

and practical experience necessary to understand client populations served by community agencies.

330. *Counseling Children*. I, S. 3 hr. PR: COUN 301, 306 or enrolled in 306 and consent. Practical application of the principles of guidance to the elementary school.

332. *Counseling Adolescents and Adults*. II, S. 3 hr. PR: COUN 301, 306 or enrolled in 306 or consent. Techniques and models that apply to the counseling of adolescents and adults will be explored. Emphasis will be given to stages of adolescent and adult development and implications for behavior. Demonstration of counseling with adolescents and adults is required.

334. *Cultural Issues*. II, S. 3 hr. PR: COUN 301, 306 or conc. enrollment in 306 or consent. Impact of cultural differences on the counseling process; gender, race, ethnicity, socioeconomic status, counseling styles and cross cultural counseling methods; group and experimental activities are required.

340. *Addictions Counseling*. II, S. 3 hr. PR: COUN 301, 306 or enrolled in 306 or consent. Specific techniques and models that apply to counseling the addicted client will be explored. Chemical addictions, food addictions, relationship addictions, and sexual addictions will be addressed. Demonstration of counseling clients with various addictions is required.

345. *Couples and Family Counseling*. I, S. 3 hr. PR: COUN 301, 306 or consent. Techniques and methods of couples and family counseling will be covered. Emphasis will be on both the theories and practice of couples and family counseling. Demonstration of counseling skills for couples and families is required.

382. *Special Topics*. I, II, S. 1-6 hr. PR: Advanced standing and consent. Independent study and directed readings in specialized areas of counseling and guidance. (Some sections of COUN 382 have prerequisite requirements. Check with the instructor.)

385. *Practicum*. I, II, S. 1-12 hr. PR: Preregistration; liability insurance; cleared for internship at close of semester, or M.A. degree, and consent of department practicum evaluation committee. An intensive supervised practical experience in public schools or agencies, in counseling with individual critique and appropriate small-group experiences. Demonstration of high professional standards, counseling skills, and personal characteristics appropriate to the counseling relationship are essential. (Due to the limited number of summer sites, there can be no guarantee of summer practicum placement.) [Practicum is a prerequisite for internship placement. Internship is a one-semester, minimum four-day per week field experience following practicum. This two-semester sequence replaces the previous one-semester practicum.]

386. *Counseling Internship*. I, II, 1-12 hr. PR: Preregistration, completion of COUN 385 (Practicum) and consent of department field work coordinator. A full-time supervised field experience. Demonstration of counseling program management skills and ethical conduct is required-ACA Ethical Behavior Standards will be used to determine appropriate professional conduct.

391. *Advanced Topics*. I, II, S. 1-6 hr.

395. *Problem in Counseling and Guidance*. I, II, S. 1-12 hr. PR: Consent. Study and research for master's degree in counseling and guidance.

Counseling Psychology (CPSY)

401. *Advanced Counseling Psychology Techniques*. I. 3 hr. PR: Advanced standing, COUN 301, 306, and 385 or equiv., and consent. Comprehensive development of counseling psychology techniques related to generic and specific theoretical models. In-setting laboratory experience and demonstration of therapy techniques required.

409. *Advanced Group Counseling/Therapeutic Techniques*. 3 hr. PR: COUN 309 or equiv. and consent. An overview of the formation, leadership techniques, research and ethical issues associated with group counseling and psychotherapy in general and for specific populations. Lecture.

431. *Advanced Consultation Techniques*. I. 3 hr. PR: COUN 331 or equiv., or consent. Multiple training and experiences in theories and techniques of consultation and delivery of human services to educational and community personnel. Simulated classroom and laboratory experiences.

460. *Introduction to Counseling Psychology*. 3 hr. PR: Consent. Overview of the history, current status and future trends associated with Counseling Psychology as a specialty area. Includes an introduction to counseling psychology research topics and practices.

463. *Advanced Theories of Counseling Psychology*. II, S. 3 hr. PR: COUN 306 and 385, or equiv., admission to post-master's graduate study; and consent. A comprehensive study of the theoretical issues in contemporary counseling.

460. *Introduction to Counseling Psychology*. 3 hr. PR: Consent. Overview of the history, current status and future trends associated with counseling psychology as a specialty area. Includes an introduction to counseling psychology research topics and practices.

463. *Advanced Theories of Counseling Psychology*. II, S. 3 hr. PR: COUN 306 and 385, or equiv., admission to post-master's graduate study; and consent. A comprehensive study of the theoretical issues in contemporary counseling.

464. *Intellectual Assessment*. II. 4 hr. PR: Advanced standing, COUN 305, and preregistrations with instructor. Administering, scoring, and interpreting individual intelligence tests.

466. *Vocational Psychology*. II. 3 hr. PR: COUN 320 or equiv., advanced standing or consent. Advanced study of theory development and research in vocational psychology and counseling; emphasis on counseling psychology, women's issues and cross-cultural counseling.

469. *Personality Testing and Interpretation*. I. 3 hr. PR: COUN 305 and consent. Advanced study in the application of personality assessment procedures and consideration of alternative methods for measuring human behavior.

470. *Doctoral Practicum in Counseling Psychology*. 1-9 hr. CPSY 401, 469, and 480 or equiv. and completed doctoral practicum application (due by March 1 of semester year preceding initial semester), and consent. Intensive clinical experience in which students, under supervision, see clients for individual and group counseling and psychotherapy. Offered at a variety of approved field-based sites. (Practicum.)

472. *Internship*. I, II, S. 1-12 hr. PR: Written approval from the Department Internship Committee, satisfactory completion of written doctoral comprehensive exams and

approval of research prospectus. Full-time supervised practice in an approved counseling psychology internship training program; minimum duration one academic year.

480. *Professional and Ethical Issues in Counseling Psychology*. II. 3 hr. PR: Advanced standing and consent. Overview of current ethical, legal, and professional issues in counseling psychology. Readings, discussion, and a written literature review of a topic related to the practice of counseling psychology.

483. *Counseling Psychology Supervision Model*. I. 3 hr. PR: CPSY 401, 480, and at least one semester of CPSY 470 or equiv., and consent. Overview of major assumptions and techniques of major counseling supervision models. Training activities include simulated and actual demonstrations each of the supervision models and critique of their assumptions, advantages, and constraints.

482. *Research Practicum in Counseling Psychology*. 1-6 hr. PR: Consent. The conduct of a descriptive or an experimental study. An overview of research design, statistical procedures, potential violations of ethical principles in the conduct of research. 1-6 hr. practicum.

483. *Counseling Psychology Supervision Models*. I. 3 hr. PR: CPSY 401, 480, and consent. Overview of major assumptions and techniques of major counseling supervision models. Training activities include simulated and actual demonstrations of each of the supervision models and critique of their assumptions, advantages, and constraints.

490. *Teaching Practicum*. I, II. 1-3 hr. PR: Consent. Intended for graduate students with college teaching responsibility in counseling psychology.

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced areas of Counseling and Counseling Psychology counseling.

492. *Directed Study*. I, II. 1-6 hr. PR: Consent.

496. *Graduate Seminar*. I. 1 hr. PR: Advanced standing and consent. Seminar in counseling psychology including written and oral presentation of methodology and results of one's own research study with supervision and critique by the instructor and members of the seminar.

497. *Research*. I, II, S. 1-15 hr. per semester. PR: Consent. Dissertation.

498. *Thesis*. I, II, S. 2-4 hr. PR: Consent.

499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not registered in regular course work but who have need to use University facilities for completion of their research or program.

Education Foundations

Anne H. Nardi, Department Chairperson
608 Allen Hall

The education foundations program in the College of Human Resources and Education offers opportunities for advanced graduate study. While the foundations program

does not offer a degree, students are encouraged to minor in the area. The minors might consist of intense study in the areas of history, sociology, philosophy, comparative education, qualitative research and policy analysis. The minor in foundations offers students the opportunity to tailor, in cooperation with the foundations faculty, a program to meet specific research interests.

Education Foundations (EDF)

300. *Sociology of Education*. I or II. 3 hr. Education as a social institution; cultural and class influences on education; social roles and career patterns in the school system; the school and problems of the community. (Also listed as SOCA 232.)

320. *Philosophic Systems and Education*. I, II, S. 3 hr. Examines different systems of educational philosophies focusing on aims, values, and criteria of education. Stresses the application of philosophic thinking to educational language, issues, methods, and subject matter.

340. *History of American Education*. I, II, 3 hr. Major forces affecting U.S. educational developments at all school levels are examined in political, social, economic, and cultural context. Major historical periods include colonial, early national, pre/post civil war, and late nineteenth to mid-twentieth century.

350. *Comparative Education*. 3 hr. PR: Graduate standing. Compares educational systems in selected foreign countries with the United States. Examines formal and informal educational influences in historical and contemporary contexts and in socioeconomic, political, and philosophical perspectives.

380. *Special Problems*. 1-6 hr. PR: Consent.

383. *Seminar*. 1-6 hr. Selected topics in historical, sociological, and philosophical foundations of education. (Titles to be announced each semester.)

385. *Practicum*. 1-12 hr. PR: Consent.

390. *Special Topics*. 1-6 hr. PR: Consent.

391. *Advanced Topics*. 1-6 hr.

491. *Advanced Study*. 1-6 hr. PR: Consent.

497. *Research*. 1-15 hr. PR: Consent.

Educational Leadership Studies

John Andes, Interim Chairperson

606 Allen Hall

Degrees Offered:

Master of Arts

Area of emphasis for Doctor of Education

The Educational Leadership Studies program prepares individuals for leadership positions primarily in elementary, secondary, and post-secondary education institutions. Although most students are pursuing administrative careers, some train for research or

staff positions. The unit offers graduate programs leading to the master of arts and certification in principalship, supervision, and superintendency. Upon admission to the program, all students are assigned an academic advisor. All students should contact their advisor for specific program and certification requirements.

At all degree levels the program is dedicated to the preparation of outstanding leaders to administer and improve education.

Graduates of educational leadership may occupy positions such as the following:

- Administrative posts in school systems including superintendents, supervisors, and principals.
- Administrative posts in colleges and universities including general leadership, academic affairs, financial affairs, student affairs, adult and continuing education, and institutional research and planning.
- Administrative posts in governmental and public service agencies, including the West Virginia State Department of Education, regional educational service agencies, and vocational rehabilitation agencies.

Admission

Applicants must comply with all university, college, and program requirements. Admission is contingent on assessment of complete official transcripts of all higher education work attempted and other evidence the faculty may deem necessary to judge probable success in the graduate program.

Programs

Optional programs are available in public school administration and supervision, higher education leadership, and adult and continuing education. A two-semester, field-based experience is required before permanent professional certification can be acquired in public school leadership and supervision. In order to graduate, the student must earn at least a 3.25 grade-point average on all program work attempted. Students seeking West Virginia certification must pass a West Virginia Department of Education content specialization examination upon completion of their academic program.

Doctor of Education Degree

The doctor of education degree is offered with tracks in public school administration, higher education, and related educational organizations (such as state departments of education). Consistent with the regulations of the University, the College of Human Resources and Education, and the program of educational leadership, each track is individually designed by the doctoral student, the student's advisor, and the doctoral committee.

Educational Leadership Studies (ED A)

300. *Public School Organization and Administration*. 3 hr. Basic concepts through which administrators, supervisors, and teachers gain understanding of general problems related to operation of schools and school systems.

318. *School Business Administration*. 3 hr. PR: Consent. Sound business administration for central office school administrators. Microcomputer competency in IBM compatible word processing, data base, and spreadsheet applications required prior to course completion.

320. *Human Resources Management*. 3 hr. PR: Consent. The determination of student, employee, and organizational personnel needs and the development of plans and programs to meet these needs.

330. *Principles of Educational Leadership*. 3 hr. PR: Consent. Problems of school leaders in the areas of administration, supervision, and instruction.

331. *Principles of Supervision*. 3 hr. PR: Consent. Elementary, junior high, and senior high supervision

333. *School Law*. 3 hr. PR: Consent. Overview of the generally accepted legal principles which affect the student, teacher, and principal in a public school setting.

334. *College Student and the Courts*. 3 hr. PR: Consent. A study of the major areas of higher education law from the perspective of the college student. A case study approach.

335. *Introduction to College Student Personnel*. 3 hr. PR: Consent. A study of the organization and administrative functioning components, concepts, and models of student personnel administration systems using a historical and topical approach. Conceptual approach based upon the student development model.

336. *Fund-raising and Foundation Management*. 3-6 hr. PR: Consent. (Fall, even years) Studies in fund raising, alumni relations, and foundation management. (Also listed as JRL 312.)

337. *College Business Management*. 3 hr. Covers knowledge of such areas as budgeting, budget preparation and administration, resource reduction and reallocation, and grants/contracts preparation and administration.

338. *Higher Education Administration*. 3 hr. Key concepts of organization and administration within higher education institutions, concentrating primarily on the nonacademic components of the institutions, from the president to first-level supervisor.

339. *The College Student*. 3 hr. Review of research and literature on college students from freshman through graduate school. Emphasis on student subcultural patterns.

350. *Community College Administration*. 3 hr. An analysis of the historical/philosophical development of the community colleges movement in the U.S. A specific focus on developing an awareness and critical understanding of the administrative characteristics of the internal organizational components.

351. *Administrative Procedures in Adult Education*. 3 hr. PR: Consent. (Offered off-campus only.) Theories and principles of administering adult education organizations as they relate to planning, organizing, staffing, initiating, delegating, integrating, motivating, decision making, communicating, establishing standards, financing, budget defense and control, and measuring results.

352. *Professionalism in Extension Service*. 3 hr. PR: Consent. (Offered off-campus only.) Role of Extension Service professionals in social change; study of community systems, professional relationships, accountability, ethics, obligations to clientele.

353. *Community Education: Administration and Organization*. 3 hr. PR: Consent. Study of the rationale, methods, and procedures in administering and programming community education. Experiences in planning, adapting, and evaluating programs independently and in consort with school and community plans.

373. *Professional Development*. 1-6 hr. (May be repeated for credit.) PR: Department consent. Specially designed experiences for those interested in advancing professional skills in a particular specialty. (Not for degree credit in programs in the College of Human Resources and Education.)
380. *Topics in Supervision*. 3 hr. Special knowledge and skills for supervisors K-12 including media, computers, reading, multicultural education, testing, and special education.
385. *Practicum*. 1-12 hr. PR: Consent.
388. *Research-Evaluation-Assessment*. 3 hr. PR: Consent. Research, evaluation, and assessment procedures related to administrative decision making and problem solving to increase the general effectiveness of educational institutions.
389. *School-Community Relations*. 3 hr. PR: Consent. A study of the systems through which the school can be interpreted to its community.
391. *Advanced Topics*. 1-6 hr.
395. *Site Based Administration*. 3 hr. A study of the active role of principals in Early, Middle, and Adolescent schools. Specific emphasis is placed upon the areas of effective schools, instructional leadership, special services and facilities management.
397. *Master's Degree Research or Theory*. 1-15 hr.
402. *Central Office Leadership*. 3 hr. PR: M.A. in education administration, or equiv., or consent. Roles, relationships, behaviors, and competencies which characterize the school superintendent and staff. (Offered in fall and summer of even years.)
403. *Education Administration Theory*. 3 hr. PR: M.A. in education administration, or equiv., or consent. Interdisciplinary study of the major concepts of education administration theory and the application to educational settings.
404. *Public Education Finance*. 3 hr. PR: M.A. in education administration, or equiv., or consent. Basic concepts. (Offered in spring of even years.)
405. *Administration of Educational Facilities*. 3 hr. PR: M.A. in education administration, or equiv., or consent. The planning, evaluation, and management of current and future school facilities.
406. *Public Education and the Law*. 3 hr. PR: M.A. in education administration or equiv., or consent. Legal permissives and limitations involved in setting policy for organization of and administration of public schools.
407. *Collective Bargaining in Public Education*. 3 hr. PR: M.A. in education administration, or equiv., or consent. This course is designed to inform school administrators about the concepts and principles of negotiating and implementing collective bargaining agreements.
408. *Organizational Analysis*. 3 hr. PR: M.A. in education administration, or equiv., or consent. An examination of alternative means for the analysis of organizational structures, interrelationships, and functions. A field analysis is required.

409. *Politics of Education*. 3 hr. PR: M.A. in education administration, or equiv., or consent. An examination of the internal political nature of school systems, and of the external influence of legislative, judicial, and administrative bodies and interest groups.

410. *Advanced Supervision*. 3 hr. PR: Consent. Exploring theories, research and practice of pre-service and in-service instructional supervision in the classrooms of novice and mature teachers. (Also listed as C&I 410.)

456. *Administration of Academic Affairs*. 3 hr. PR: Consent. Management, leadership, and administrative roles of academic affairs offices in colleges and universities including academic personnel, program definition, research and teaching issues, and other functions of academic oversight.

457. *Governance of Higher Education*. 3 hr. PR: Consent. Formulation and implementation of state master plans and the roles of state governing bodies in public and private institutions.

459. *Adult and Continuing Education*. 3 hr. Principles, concepts, and processes involved in programming for adults in a community setting. Nature of adult learning, subject matter, and learning environment.

460. *Development of Administration in American Higher Education*. 3 hr. The administrative development of American higher education from 1636 to the present, including internal trends and external forces.

462. *Higher Education Law*. 3 hr. Critical legal issues of higher education—public and private—using a case study approach.

463. *Higher Education Finance*. 3 hr. Financial concerns in higher education with emphasis on taxation and legislative actions, sources of income, budgeting, and cost analysis.

465. *Institutional Research and Planning*. 3 hr. Accumulation, analysis, and interpretation of data relevant to decision making and the allocation of institutional resources. (Offered in spring of even years.)

467. *Higher Education Collective Bargaining*. 3 hr. The process and content of collective bargaining in higher education and its impact on institutional governance and academic jurisdictions.

469. *Education Administration Internship*. 3-6 hr. (May be repeated for credit.) PR: Consent. Practical experiences in the administration of an organizational unit under the supervision of an administrator within the unit.

470. *Principal's Planned Field-Based Experience*. 3 hr. PR: Three years of successful experience as a teacher and have a position as principal or assistant principal. Consists of problem-solving techniques and seminar activities as applied to explicit problems in the professional environment. (Required for permanent certification as a principal.)

471. *Supervisor's Planned Field-Based Experience*. 3 hr. PR: Three years of teaching experience, 15 hours completed in a master's degree program, and be employed full-time as a supervisor. Consists of problem-solving techniques and seminar activities as

applied to explicit problems in the professional environment. (Required for permanent certification as a supervisor.)

472. *Superintendent's Planned Field-Based Experience*. 3 hr. PR: Five years of successful experience as a teacher or supervisor, and employed as a superintendent or assistant superintendent. Consists of problem-solving techniques and seminar activities as applied to explicit problems in the professional environment. (Required for permanent certification as a superintendent.)

480. *Seminar*. 1-6 hr. PR: Consent.

485. *Special Topics*. 1-6 hr. PR: Consent.

491. *Advanced Study*. 1-6 hr. PR: Consent. Advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

496. *Doctoral Orientation Seminar*. I, 1-6 hr. Required for all new doctoral students.

497. *Research*. 1-15 hr. PR: Consent.

Educational Psychology

Anne H. Nardi, *Department Chairperson*
608 Allen Hall

Degree Offered:

Master of Arts, Area of emphasis for Doctor of Education

Master of Arts

The educational psychology program in the College of Human Resources and Education offers opportunities for graduate study and research leading to the master of arts. Professional preparation focuses on learning and development, instruction and research. Accordingly, students are expected to achieve competencies in these areas.

Programs are planned jointly by the student and the student's advisor to meet particular career needs. Minor fields of study are also planned for each student as appropriate. In addition to the general requirements of the University and the College of Human Resources and Education, the department requires a core of courses and supporting competencies of all graduate students.

Educational psychologists function in a variety of settings. The program prepares and places competent educational psychologists in educational settings at all levels, such as educational agencies at local, state, and federal levels; public and private human service centers; medical centers; and business and industrial settings.

All applicants must comply with the general requirements of the University and the College of Human Resources and Education. The applicant must have an undergraduate degree from an accredited institution and must submit official transcripts of the undergraduate work, the official scores for either the Graduate Record Examination (GRE) or the Miller Analogies Test (MAT), a 500-word, written goal statement, a personal vita, and three letters of reference.

Core Each student is expected to complete the following core of courses as part of the master's plan of studies:

ED P 300 *Advanced Educational Psychology*

ED P 311 *Statistical Methods 1*

ED P 330 *Foundations of Educational Measurement*

ED P 350 *Applied Behavior Analysis*

The option requires a minimum of 30 hours of course work including the completion and successful defense of a thesis or the completion of 30 hours of course work including the completion of a problem. Those students who plan to pursue a doctorate are required to take the thesis option.

Application Criteria The credentials for all applicants are screened by a three-member admissions committee of the department. The criteria used as guidelines for evaluating applicants are:

- Total GRE scores of 1,100 or higher or MAT score of 55 or higher; international students from a country in which English is not the native language must have a TOEFL score of at least 550 and a combined total score of at least 1000 on the GRE verbal and the TOEFL.
- An undergraduate GPA of at least 3.0.
- A graduate GPA of 3.25 or higher for graduate work completed to date.
- The extent to which the applicant's goals and objectives may be accomplished if admitted to the program.
- Favorable recommendations and appropriate background experiences.

Good Standing To remain in good standing, a student must have an average grade of B or better for all courses in the program and make satisfactory progress toward the completion of the program competencies (as described in the following section).

Doctor of Education

The doctor of education requires a minimum of 72 hours of graduate credit beyond a bachelor's degree or 42 hours beyond a master's degree. In addition, completion of a core of required courses, fulfillment of competency requirements, and an approved dissertation are mandatory.

Each student is expected to complete the following core courses as part of the doctoral plan of studies:

ED P 301 *Introductory Behavior Analysis: Human Resources*

ED P 440 *Human Development and Behavior*

ED P 451 *Principles of Instruction*

ED P 480 *Research in Education* (PR: ED P 311)

The student is also expected to enroll in a doctoral seminar, ED P 494, for two semesters for in-depth coverage of specialized content issues in educational psychology.

Competency Areas There are three competency areas in the program: learning and development, instruction, and research. Students are expected to fulfill the program competency requirements by meeting the goals and objectives specified for the program. The learning and development competency product will take the form of a theoretical paper, the instruction competency product will be a course or other type of instructional sequence of comparable magnitude, and the research competency product will be a data-based research paper of publishable quality.

Inquiries should be addressed to the Chairperson of the Department of Educational Psychology, Allen Hall, College of Human Resources and Education, West Virginia University, P.O. Box 6122, Morgantown, WV 26506-6122.

Educational Psychology (ED P)

260. *Media and Microcomputers in Instruction*. I or II, S. 3 hr. The effective operation and educational uses of educational media including microcomputers. Hands-on experience with equipment and in designing materials for an instructional unit incorporating media and/or microcomputers.

269. *Behavioral Technology for Education*. I or II, S. 3 hr. PR: ED P 105 recommended. Behavioral science applied to instructional systems. Complex systems; feedback loops; measuring relevant variables, collecting data. Applying schedules of reinforcement. Effective stimulus control for students and administrators. Relationship between system and institution. Behavioral ethics.

300. *Advanced Educational Psychology*. I, II, S. 3 hr. Design for beginning graduate students. Psychological principles of learning and development as they relate to processes of classroom instruction.

301. *Introductory Behavior Analysis: Human Resources*. I. 3 hr. Introduction to behavior analysis in education and human resources. Basic practice in measuring and shaping human behavior. A comprehensive examination of relationships among human organisms, environment, and behavior.

311. *Statistical Methods 1*. I, S. 3 hr. PR: MATH 3. Basic concepts of statistical models, distributions, probability, random variables, tests of hypotheses, confidence intervals, regressions, correlation, transformation, F and chi-square distributions, analysis of variance and sample size.

312. *Statistical Methods 2*. II. 3 hr. PR: STAT 311. Extension of basic concepts of statistical models, design of experiments, multiway classification models, factorials, split plot design, simple covariance, orthogonal comparisons, multiple linear and nonlinear regression and correlation analysis, chi-square and nonparametric statistics.

320. *Introduction to Research*. I, II, S. 3 hr. Basic concepts, strategies, methodologies, designs, and procedures of research in education. Major emphasis on integrating research designs, measurements, and statistics for initiating research projects, collecting and analyzing data, and interpreting and reporting findings.

330. *Foundations of Educational Measurement*. I, II, S. 3 hr. An examination and application of norm-referenced and criterion-referenced principles and procedures to the measurement and prediction of pupil performance.

341. *Multivariate Methods 1*. (Alternate years.) 3 hr. PR: STAT 311 or equiv. Basic matrix operations, multiple regression analysis, discriminant analysis for two groups, multivariate analysis of variance for one- and two-way designs, and analysis of covariance involving multiple covariates. Applying SAS Procedure Matrix for data analyses.

342. *Multivariate Methods 2*. (Alternate years.) 3 hr. PR: STAT 311 or equiv. Matrix operations, multivariate multiple regression analysis, canonical correlation analysis, discriminant analysis for multiple groups, qualitative discriminant analysis applying Bayes' theorem, principal component analysis, and fundamentals of common factor analysis. Data analyses with SAS Procedure Matrix.

343. *Statistical Analysis in Education*. 3 hr. PR: ED P 330 or consent. Review measures of central tendency, percentiles, and correlation. Emphasis placed on correlation, regression, testing hypothesis, nonparametric tests, and other measures in analysis and inference.
350. *Applied Behavior Analysis*. I. 3 hr. PR: ED P 301 or equiv. Application of reinforcement theory as an instructional technique in changing human behavior. Analysis of problems in terms of behavior and the design of instruction and treatment programs to produce desired change.
355. *Applied Cognition and Strategic Learning*. II. 3 hr. Principles of information processing and cognitive learning strategies applicable across content areas; emphasis on individual study skills, expert-novice research, strategic reading, process writing, metacognition, problem presentation (e.g. mathematics), and competence.
359. *Conceptual Foundations of Behavior Analysis*. 3 hr. Comprehensive introduction to the basic science of human behavior and its philosophy. Provides a conceptual framework for a variety of applied fields.
385. *Practicum*. I, II, S. 1-12 hr. PR: Consent.
391. *Advanced Topics* I, II, S. 1-6 hr.
397. *Master's Degree Research or Theory*. I, II, S. 1-15 hr.
400. *Verbal Behavior 1*. (Alternate Years.) 3 hr. PR: ED P 350 or consent. Behavioral analysis of complex verbal behavior in person-to-person contacts in text materials and in instructional systems.
420. *Seminar in Educational Research*. I, II. 2 hr. PR: ED P 311 and consent. Identification of research problems in education, consideration of alternative designs and methods of investigations, and development of a research proposal at the advanced graduate level.
423. *Designing Single Case/Group Research*. I. 3 hr. Strategies and tactics for observation, measurement, and experimental investigation of functional relationships between the behavior of individuals and their environment are presented as a means for understanding what controls human behavior.
440. *Human Development and Behavior*. I. 3 hr. Psychological theories of human development. Contemporary theories analyzed and compared, with emphasis on their implication for classroom behavior and the educational process.
450. *Psychological Foundations of Learning*. I, S. 3 hr. Psychological and philosophical foundations of major learning theories and their implications for instructional procedures.
451. *Principles of Instruction*. II. 3 hr. PR: Consent. Basic principles of teaching-learning process implied in major learning theories; study of factors in learning, variables in instructional program, and principles of instructional design.
454. *Memory*. II. 3 hr. Short-term, memory, long-term memory, memory networks, and memory problems as they relate to school learning, strategies for instruction, and live-long adaptation in a dynamic society.

455. *Thinking/Learning in Social Contexts*. I. (Alternate years.) 3 hr. PR: Consent. Surveys social-cognitive literature relevant to creating effective learning environments; group dialogues, peer interaction, cooperative learning, scaffolded instruction, meaning-making dialogues, cognitive apprenticeships, situated learning, strategy internalization, and dynamic assessment.

456. *Interactive Technologies in Education*. I. (Alternate years). 3 hr. PR: consent. Principles of human cognition as a basis for electronic tools; problem solving software, multimedia, intelligent tutoring systems, distance learning; active/generative learning, knowledge construction, interdisciplinary learning, multiple knowledge representations, and educational reform.

480. *Seminar in Educational Psychology*. I, II, S. 1-6 hr. PR: Consent.

481. *Special Topics in Educational Psychology*. I, II, S. 1-6 hr. PR: Consent.

490. *Teaching Practicum*. I, II. 1-3 hr. PR: Consent. Intended for graduate students with college teaching responsibility. Provides a supervised experience for graduate students in a teaching situation.

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced areas of educational psychology.

492. *Directed Study*. 1-6 hr. Directed study, reading, and/or research.

494. *Special Seminars*. 1-6 hr. Special seminars arranged for advanced graduate students.

495. *Independent Study*. 1-6 hr. Faculty supervised study not available through regular course offerings.

496. *Graduate Seminar*. I, II. 1 hr. PR: Consent. Designed to permit graduate students an opportunity to present research to the assembled faculty and the graduate student body.

497. *Research*. I, II, S. 1-15 hr. PR: Consent. Dissertation.

498. *Thesis*. I, II, S. 2-4 hr. PR: Consent.

Elementary Education

R. Jerrald Shive, Department Chairperson, Curriculum and Instruction

602 Allen Hall

Degree Offered:

Master of Arts

Master of Arts

The Department of Curriculum and Instruction provides opportunities for graduate study and research leading to the degree of master of arts (M.A.) for educators and other professionals with educational responsibilities. The primary purpose of the masters program in elementary (early/middle) education is to provide increased knowledge, skill, and competence for teachers working with children in the elementary (early/middle) school setting. The graduate elementary (early/middle) teacher education program has three major areas of emphasis: general education, subject area/grade level, curriculum and methods, and electives.

These emphases are planned jointly by the student, the student's advisor, and the student's committee to meet the career needs of the student. In addition to the general requirements of the University and the College of Human Resources and Education, there is a core of courses or course areas and supporting competencies required of all graduate students in the department.

The purpose of the program is to prepare master teachers who work with children from nursery through elementary school. The program provides the opportunity to specialize in early childhood, middle childhood, or a subject area. With advisor approval, electives may be selected that enhance the student's personal goals. While teacher certification is not a part of the master's program, students, through careful planning, may be able to complete some courses that are required for certification while working on a graduate degree.

For further information on admission and program requirements, write Chairperson of Curriculum and Instruction, College of Human Resources and Education, 602 Allen Hall, P.O. Box 6122, Morgantown, WV 26506-6122.

Requirements All applicants must comply with the general requirements of the University and the College of Human Resources and Education.

Required Courses	Hours		
	Program A*	B**	C***
C&I 301	3	3	3
C&I 330	3	3	3
C&I 340	3	3	3
C&I 350	3	3	3
C&I 388	0	0	3
C&I 391	0	3	0
C&I 497	6	0	0
ED F 320 or 340	3	3	3
ED P 320	3	3	0
ED P 300 or 330	3	3	3
RDNG 321, or 323, or 327, or 330	3	3	3
Total Required Courses	30	27	24
General Education Electives	0	3	12
(All elective courses must be approved by the advisor before enrollment.)			
Total for Master's Degree.....	30	30	36

Emphasis: Early Childhood Education (Pre K-4)

Required Courses	Hours		
	Program A*	B**	C***
C&I 312	3	3	3
C&I 314	3	3	3
C&I 316	3	3	3
C&I 391	0	3	0
C&I 497	6	0	0
C&I 317 or RDNG 323	3	3	3
CDFS 341 or approved elective	3	3	3
ED P 320	3	3	0
ED P 330	3	3	3
Total Required Courses	27	24	18

Approved Electives

Restricted Electives in

Early Childhood Education 3 3 3

Supportive Electives in Education 0 3 15

(All elective courses must be approved by the advisor before enrollment.)

Total for Master's Degree 30 30 36

*Program A—Thesis required.

**Program B—Research problem required.

***Program C—36-semester hour course work program.

Curriculum and Instruction (C&I)

205. *The Junior High School*. I, II, S. 2 hr. PR: Consent. Developing philosophy, program, and practices of the junior high school.

210. *Early Childhood Education 1*. I, II, S. 3 hr. PR: CDFS 216. An introduction to curriculum objectives, instructional methods and materials, and evaluation in early childhood education (Pre-K to 4th grade) that includes a field experience with individualized instruction for one child.

211. *Early Childhood Education 2*. I, II, S. 3 hr. PR: CDFS 216, C&I 210 or consent. This course is designed for individuals who will be working within early childhood education Pre-K to 4th grade. Topics include: working with families of young children; designing, teaching and evaluating experimental lessons for small groups of children; and gathering and assessing developmental data on small groups of children. A semester-long field experience with a class of young children is required.

212. *Methods in Preschool Education*. I. 3 hr. PR: ED F 1 or C&I 7 or equiv. Development of an experiential model of teaching young children. Application of methods in basic needs areas of nursery-early childhood education consistent with an experiential model of teaching. Emphasis on safety, multicultural education, classroom management, working with special needs populations and mainstreaming, and cooking and nutrition.

214. *Creative Experiences in Early Childhood*. II. 3 hr. PR: ED F 1 or C&I 7 or equiv. Examination of creative experiences for young children and their relationship to child development. A special focus on play behavior as a learning medium with emphasis on program planning, curriculum development, and instructional strategies.

216. *Early Language and Communication Experiences*. I. 3 hr. PR: ED F 1 or C&I 7 or equiv. This course presents activities for developing language and communication skills in children 2-5 years of age. It covers a broad range of temporary and enduring forms of communication in visible and audible media.

218. *Management of Preschool Education*. II. (Alternate years.) 3 hr. PR: ED F 1 or C&I 7 or equiv. (A field experience with children 2-5 years of age is required.) Planning, designing, and assessing programs for children ages 2-5 years with emphasis on management skills.

224. *Approaches to Teaching Language*. II. 2 hr. PR: LING 1 and ENGL 111. Designed for prospective teachers of English and language arts. Focus is upon planning and implementing methods of teaching English as a language. Materials and resources appropriate to public school instruction are analyzed and utilized.

225. *Approaches to Teaching Literature*. II. 2 hr. PR: Junior standing. Designed for prospective teachers of English and language arts. Course focuses upon methodologies for teaching literature in public schools. Workshop format will provide opportunities for peer teaching activities as students apply methods of teaching literature.

267. *The Music Education Program*. S. 3 hr. PR: Consent. Organization and administration of the complete music education program for grades 1-12.

280. *Special Problems and Workshops*. I, II, S. 2-4 hr. (Maximum of 8 semester hours may be applied toward the master's degree.) PR: 14 hr. in education. Credits for special workshops and short intensive unit courses on methods, supervision, and other special topics.

287. *Advanced Clinical Experience*. I, II, S. 1-6 hr. PR: Consent. Clinical experience in teaching-learning situations at any level.

300. *U.S. Education for International Students*. I. 3 hr. PR: International students with graduate status and developing oral and written English skills. To assist international students in understanding the U.S. system of education. Included: dominant U.S. values related to education; structure of U.S. education at all levels; models and strategies; field trips; international comparisons.

301. *The Elementary-School Curriculum*. I, II, S. 3 hr. PR: 20 hr. of undergraduate credit in elementary education, or consent. Analysis of curriculum designs in elementary education with emphasis on methods and techniques of development.

306. *Curriculum for Middle Childhood*. I, S. 3 hr. Survey course which includes: historical, social, and cultural influences on the curriculum; the learner characteristics; curriculum and instructional organization and their relationship to facilities available; evaluation and implementation of middle childhood curriculum.

308. *Introduction to Alternative Learning Environments*. I. (Alternate years.) 3 hr. This course will provide opportunities for educators to explore and analyze the trends and issues in alternative learning environments in public education.

309. *Experiences in Alternative Learning Environments*. S. (Alternate years.) 6 hr. PR: C&I 308, ED F 320, consent. This course helps teachers to learn and practice skills that are needed to be an effective teacher in an alternative teaching environment.

312. *Early Childhood Curriculum*. I. 3 hr. PR: C&I 210, 211, or consent. Curriculum development for early childhood education Pre-K to 4th grade, including social, creative, cognitive, physical, and academic goals. Societal, historical, and theoretical influences on early childhood curriculum are examined.

314. *Early Childhood Instruction*. I, II. 3 hr. PR: C&I 210, 211, or consent. Design of instruction for continuous improvement toward mastery of curriculum goals for early childhood education Pre-K to 4th grade.

316. *Early Childhood Program Development and Evaluation*. I. 3 hr. PR: C&I 210, 211 or consent. Development, administration, and evaluation of facilities, programs, and support systems for early childhood education Pre-K to 4th grade. Includes a focus on family connections and support systems related to early childhood classrooms.

317. *Language Arts in Early Childhood*. I, II. 3 hr. PR: None. Designing instruction for an integrated development of writing, reading, speaking, and listening with an emphasis on literacy acquisition in early childhood education Pre-K to 4th grade.

318. *Storytelling in Early Childhood*. I, II. 3 hr. This course will assist students in telling, reading, and creating stories for children. Techniques, methods, and research effective in the art of storytelling will be examined and applied as they relate to total child development.

319. *Behavior Modification in Early Childhood Education*. I, II. 3 hr. PR: None. Application of behavior modification principles to classroom management in early childhood education Pre-K to 4th grade.

330. *Mathematics in the Elementary School*. I, II, S. 3 hr. PR: Consent. Addresses current issues and trends in elementary mathematics education. Designed for the practicing elementary teacher.

333. *Corrective Techniques in Mathematics Education*. I, S. 3 hr. PR: Consent. Materials and methods used in diagnosis and remediation of learning difficulties in mathematics.

334. *Mathematics in the Secondary School*. I, S. 3 hr. PR: Consent. Patterns of mathematics curriculum in the secondary school; practices in teaching mathematics; preparation, selection, and use of instructional materials. Designed for the practicing secondary mathematics teacher.

337. *Mathematics in the Junior High School and Middle School*. II. 3 hr. PR: 6 hr. college mathematics or consent. Study of teaching of mathematics in the junior high school and/or middle school; application of mathematics content to teaching; instructional techniques and materials.

340. *Science in the Elementary School*. I, II, S. 3 hr. PR: 20 hr. of undergraduate credit in elementary education, or consent. Analysis of methods, curriculum patterns, and trends in elementary school science. Understanding and development of scientific attitudes appropriate at the elementary-school level.

344. *Science in the Secondary School*. 3 hr. PR: Consent. Nature and function of science in secondary schools supported by current research and development; includes analysis of structure and practice of science curriculum and instruction issues. 3 hr. lec.

350. *Social Studies in the Elementary School*. I, II, S. 3 hr. PR: 20 hr. of undergraduate credit in elementary education, or consent. Comprehensive consideration of objectives, content, methods, including unit procedures; materials including objects, models, exhibits, and museum items, as well as textbooks, collateral reading, maps, and graphs; means of evaluating social growth and development.

357. *Principles of Economic Education*. S. 3 hr. Workshop for principals, teachers, and supervisors with emphasis on the economic structure of our society and methods of integrating economics into the school program. (Sponsored jointly by College of Human Resources and Education and College of Business and Economics.)

359. *Classroom Simulation Techniques*. II, S. (Alternate years.) 3 hr. To provide experience in the use of learning games and simulations as an instructional technique and the opportunity to develop—under supervision—simulated activities and games to be used in a variety of learning environments.

373. *Professional Development*. I, II, S. 1-6 hr. (May be repeated for credit.) PR: Department consent. Specially designed experiences for those interested in advancing professional skills in a particular specialty. (Not for degree credit in programs in the College of Human Resources and Education.) (Graded as S/U.)

377. *Children's Television: Problems and Potentials*. S. 4 hr. PR: Consent. Provides parents and teachers with strategies for monitoring, evaluating, and directing television viewing habits of youth; pertinent research studies, school and community action programs, and home and school education programs are discussed and practiced.

380. *Special Topics*. I, II, S. 1-6 hr. PR: Consent.

383. *Seminar*. I, II, S. 1-6 hr. PR: Consent.

385. *Supervision of Student Teachers*. I, II, S. 3 hr. PR: Consent. For persons working or intending to work with education students in field experiences. Course focuses on the development and application of supervisory skills involved in effective guidance of student teachers and education students.

386. *Teaching Strategies for Middle Childhood*. II, S. 3 hr. Surveys instructional strategies appropriate for facilitating preadolescent learning. Includes the role of the teacher; how the teacher uses resources within and outside the classroom as they relate to instruction of the learner, age 10-14 years.

387. *Advanced Teaching Strategies*. I, II, S. 3 hr. PR: Graduate standing. Deals with methods as one critical variable in teaching. Examines ways and means to describe, plan the use of, implement, and evaluate teaching methods. Analysis and implementation of teaching methods and component skills of teaching.

388. *Classroom Organization and Management*. I, S. 3 hr. Discusses research identifying components of classroom organization and environment which influence learning; reviews teacher behaviors and learning activities which research indicates lead to more effective teaching. Stresses implementation strategies relevant to classroom settings.

389. *Cultural Diversity in the Classroom*. I, S. 3 hr. PR: Graduate standing or consent. Provides opportunities for educators to increase awareness of their own ethnic backgrounds, foster understanding of the interactive effects of gender, race, ethnicity, and socio-economic status, and develop appropriate teaching materials and methods.

391. *Advanced Topics*. I, II, S. 1-6 hr.

395. *Practicum*. I, II, S. 1-12 hr. per sem. or session—aggregating not more than 12 hr. PR: 9 graduate hours in Education. (Enrollment with permission of advisor or instructor in consultation.) Special individual and group projects. To provide appropriate residence credits for special workshops, prolonged systematic conference, or problems and projects in education.

401. *Curriculum Development*. I, II, S. 3 hr. PR: Consent. The study of the concepts underlying school curriculum.

407. *Theories, Models, and Research of Teaching*. II. 3 hr. PR: ED F 320 or consent. The theories behind selected models of teaching as well as research in teaching and best practices.

408. *Contemporary Determinants of Curriculum*. II, S. 3 hr. PR: C&I 307 and ED F 340 or consent. Contemporary determinants of curriculum development.
409. *Curriculum Theories*. I, II, S. 3 hr. PR: C&I 408 or consent. Theories underlying curriculum from the past to the present and projected to the future.
438. *Survey of Major Issues in Mathematics Education*. II, S. 3 hr. PR: Consent. Individual and group research on selected topics in mathematics education.
457. *Social Studies Curriculum Development, K-12*. I. 3 hr. PR: C&I 301 or 304 and C&I 350 or 354. Stresses the application of principles and procedures pertinent to the development of social studies programs in elementary and secondary schools. Strong emphasis will be placed on the analysis of current social studies curriculum materials.
487. *Teaching Effectiveness*. 3 hr. PR: Advanced graduate standing or consent. Explores twentieth century/attitudes toward effective teaching from a variety of perspectives; instigates teacher, learner, content and environment; examines how questions asked reveal thinking regarding interaction of elements of teaching/learning situation.
488. *Higher Education Curriculum*. II. 3 hr. Analysis and evaluation of post-secondary curriculum with emphasis on organizing, translating, and applying findings. Topics include curriculum shaping forces; institutional patterns; policy, components and change; and principles and techniques of development, experimentation, and evaluation.
489. *Teaching in Higher Education*. I. 3 hr. PR: Graduate standing. A general methods course involving instructional concepts and strategies for present/prospective faculty in higher education. Comprehensive consideration of objectives, planning criteria and methods, teaching strategies, and evaluation in meeting the needs of adult learners.
490. *Teaching Practicum*. I, II, S. 1 and 3 hr. PR: Consent. Intended for graduate students with college teaching responsibility. Provides a supervised experience in a teaching situation. (Graded as S/U.)
491. *Advanced Study Project in Education*. I, II, S. 3-6 hr. Research for the program leading to the Certificate of Advanced Study in Education (C.A.S.).
496. *Advanced Seminar*. I, II. 1 hr. PR: Consent. Opportunity for the advanced graduate student to present the student's research to faculty and/or student groups.
497. *Research*. I, II, S. 1-15 hr.
499. *Colloquium in Curriculum and Instruction*. I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking course work credit, but who wish to participate in academic programs.

Reading

R. Jerrald Shive, Department Chairperson, Curriculum and Instruction
607 Allen Hall

Degree Offered:

Master of Arts

The Department of Curriculum and Instruction provides opportunities for graduate study and research leading to the master of arts for educators and other professionals with educational responsibilities. The primary purpose of the master's program in reading is to provide increased knowledge, skill, and competence for teachers or those who work in the field. The program contains a number of related options for emphasis within its framework, making it flexible enough to meet a wide variety of needs.

Options are planned by the student, the student's advisor, and the student's graduate committee to fit the student's career plans. In addition to the general requirements of the University and the College of Human Resources and Education, the department requires a core of courses or course areas and supporting competencies.

Requirements

All applicants must comply with the general WVU requirements, and requirements of the College of Human Resources and Education and the reading program.

Professionals with successful teaching experience at the elementary, secondary, or college level may elect to enroll in these courses to increase their competencies as reading teachers, to keep themselves informed of latest trends and developments in reading education, or to prepare for positions of greater responsibility. Students who plan to enter the teaching field may also wish to enroll in these courses to increase their overall skills and knowledge.

Courses

Course offerings provide opportunities to become familiar with the organization, implementation, and administration of developmental and remedial reading programs at the elementary, secondary, and college levels. Advanced students of superior academic and professional background have opportunities to participate in clinical work and to become involved in research.

Programs of study for the doctor of education degree are worked out individually with each student. Course requirements depend upon previous academic background and experience and the position for which the student wishes to prepare. Practical training for teachers and specialists-in-training is provided by the Reading Clinic.

For further information on admission and program requirements, write Chairperson, Department of Curriculum and Instruction, College of Human Resources and Education, 602 Allen Hall, P.O. Box 6122, Morgantown, WV 26506-6122.

- Students must complete six or more hours in reading within two years after admission (probationary or regular) or admission will be invalidated and the student will be required to reapply.

- Program A—Completion of a minimum of 36 hours including the completion of a problem or thesis.

- Program B—Completion of a minimum of 36 hours of course work.

- Successful completion of a written final examination.

The course requirements in Program A and B lead to reading specialist certification. Electives should be decided in conference with advisor.

Required Courses	Hours	
	Program A	B
RDNG 321	3	3
RDNG 322	3	3
RDNG 324	3	3
RDNG 326	3	3
RDNG 327	3	3
RDNG 340	3	3
RDNG 341	3	3
RDNG 495	6	0
C&I 301 or 304 or 307	0	3
ED P 330 or RDNG 380 <i>Measurement/Evaluation in Lang. Arts</i> ..	3	3
ED P 300 or 450 or 451 or PSYC 263 or 264 or 281 ...	3	3
SPED 250 or PSYC 282	3	3
Subtotal	36	33
Electives	0	3
Total	36	36

Reading (RDNG)

221. *Developmental Reading*. I, II. 3 hr. PR: Consent. Fundamentals of reading instruction. Emphasizes classroom organization and teaching techniques.

222. *Reading in the Content Areas*. I, II. 2 hr. Skills and strategies needed by content area teachers to reinforce the reading skills necessary for the effective learning of secondary students in the content areas.

240. *Corrective Language Arts Techniques*. I, II. 3 hr. PR: RDNG 221, consent. Fundamentals of informal language arts diagnosis and corrective classroom language arts instruction. A practicum for the utilization of informal diagnosis and correction techniques is provided.

283. *Special Workshop in Reading*. I, II, S. 1-6 hr. For elementary and secondary students in pre-service education programs, as well as for elementary and secondary teachers in in-service education.

321. *Reading Instruction in Elementary Schools*. I, II, S. 3 hr. Gives students who have little or no background in reading an opportunity to study the reading process and to learn how to apply effective techniques and methods at the elementary school level. Grades K-6.

322. *Reading Instruction in Secondary Schools*. I, II, S. 3 hr. The reading skills essential at the secondary level and how they may be developed in the various subject-matter areas.

323. *Reading and Early Childhood Education*. I, II, S. 3 hr. Development of a reading-language program for young children that includes consideration of: (1) the nature of the beginning reading process; and (2) the nature of children's cognitive, perceptual, linguistic, psychological, physical, and social growth.

324. *Foundations of Reading Instruction*. I, II, S. 3 hr. The physiological, psychological, sociological, and historical foundations underlying the development of reading proficiency.

For majors in education, reading, counseling and guidance, special education, speech communication, and other areas requiring an understanding of the reading process.

325. *Survey of Major Problems in Reading*. II, S. 3 hr. PR: RDNG 321 or 322 and 324. A research course in which each student will complete an individual problem in an area of special interest.

326. *Reading Leadership Skills*. I, II, S. 3 hr. PR: 18 hr. of M.A. requirements. Roles, responsibilities, and practices of reading specialists and administrators in organizing reading programs from early childhood through college.

327. *Developing Reading Interests*. I, II, S. 3 hr. Emphasis on methods and techniques for developing reading habits, interests, and tastes and on motivating individuals to read. Special attention is given to integrating the use of children's literature with creative oral and written language.

330. *Teaching the Language Arts*. II, S. 3 hr. The interrelationship of the different phases of the language arts. Special attention to organizing the language arts program, selecting materials and equipment, and understanding effective techniques and methods for teaching listening, oral language, written language, handwriting, and spelling.

331. *Selection and Evaluation of Reading Materials*. I, S. 3 hr. PR: RDNG 321. Survey of critical reading skills, techniques, and procedures with emphasis on the selection of supplementary materials needed for effective development and remedial reading programs.

332. *Survey of Major Problems in the Language Arts*. II, S. 3 hr. PR: RDNG 330 or consent. An advanced course covering major problems of the teacher or supervisor of language arts instruction. A research course in which the student completes an individual problem.

340. *Instructing Students Who Have Reading Difficulties*. II, S. 3 hr. PR: 6 hr. of RDNG 321, 324 or 322. A methods course that emphasizes ways to intervene when students face reading difficulties. Focuses on methods that can be used by classroom teachers, reading specialists, and other special teachers of reading and language arts.

341. *Problems in Reading*. II, S. 3 hr. PR: RDNG 340. A laboratory course in the University Reading Clinic. Major emphasis on tutoring children who have reading problems.

342. *Reading Diagnosis and Prescription in Learning Disabilities*. I, II, S. 3 hr. PR: Consent. Basic course in diagnostic and prescriptive reading techniques and procedures for learning disability majors. Special emphasis on practicum experiences in administering and interpreting reading tests, as well as prescribing and administering remediation suggestions.

380. *Seminar*. I, II, S. 1-6 hr. PR: Consent. Seminar for master's degree students stressing special topics concerned with the education and sociological and psychological aspects of language arts instruction.

381. *Special Topics*. I, II, S. 1-6 hr. PR: Consent. Special topics or research in reading and language arts for master's degree students in reading.

385. *Practicum*. I, II, S. 1-12 hr. PR: Consent. Practicum type course for master's degree student teaching, and reading administration and supervision practicum experience can be pursued.

442. *Diagnosis of Reading Difficulties*. I, S. 3 hr. PR: RDNG 340. Advanced instruction in diagnosis. Emphasis on use of standardization tests, informal tests, machines, and observation in determining reading difficulties.

443. *Correction of Reading Difficulties*. II, S. 3 hr. PR: RDNG 442 or consent. Advanced instruction correcting reading difficulties. Emphasis on methods of teaching, use of machines and commercial materials, constructing and using teacher-made exercises, and evaluating progress.

444. *Advanced Clinical Reading*. I, II, S. 3 hr. PR: RDNG 341. Laboratory course in remedial reading. Emphasis on diagnosis and treatment of reading difficulties.

480. *Seminar*. I, II, S. 1-6 hr. PR: Consent. The interrelationships among the language arts: mental, physical, and psychological deterrents to language arts; and similar topics.

481. *Special Topics*. I, II, S. 1-6 hr. PR: Admission to doctoral program in reading and consent. Advanced seminar. Weaknesses and strengths in current reading programs, needed research in reading, and suggestions for improving reading instruction at elementary, secondary, and college levels.

485. *Practicum*. I, II, S. 1-12 hr. PR: Consent. Practical application of reading theory to organizing and conducting developmental and remedial reading programs.

495. *Problem in Reading*. I, II, S. 3 hr. Research for master's degree in reading.

Rehabilitation Counseling

Robert P. Marinelli, Program Coordinator

504 Allen Hall, P.O. Box 6122

Degree Offered: Master of Science

Admission

The rehabilitation counseling program in the College of Human Resources and Education offers a curriculum at the master's degree level. All students enroll for a general rehabilitation counseling core during their first semester and then select an area of emphasis for the balance of their graduate studies.

All applicants must comply with the requirements of the College of Human Resources and Education, and the Department of Counseling, Rehabilitation Counseling, and Counseling Psychology. The program in rehabilitation counseling requires a program application, three letters of recommendation, and a program interview.

Core

All students are required to take the following core courses:

COUN 301 *Counseling Techniques*

COUN 305 *Theory and Practice of Human Appraisal*

COUN 306 *Counseling Theories*

COUN 309 *Group Counseling Theory and Techniques*

REHB 300 *Introduction to Rehabilitation Services*

REHB 310 *Medical Aspects of Disability*

REHB 312 *Psychological Aspects of Disability*

REHB 320 *Career Development and Job Placement*

REHB 472 *Counseling Practicum*
REHB 475 *Clinical Practice*
REHB 480 *Research Seminar*

Vocational Evaluation Track Additional Required Courses:

REHB 321 *Vocational Evaluation Systems and Techniques*
REHB 322 *Advanced Vocational Evaluation Techniques*
REHB 323 *Seminar in Vocational Evaluation Services*

Master of Science Degree

This professional counseling specialty provides counseling services, with a focus on career issues, to persons with physical disabilities or learning difficulties and those who are seeking readjustment from emotional problems. Counselors work for both public and private rehabilitation agencies, centers, workshops, and industry. Contact the program for additional information about the possibility of a vocational evaluation program, as well as other specialty areas. The program is fully accredited by the Council on Rehabilitation Education (CORE). A program option is currently available in vocational evaluation through the 1997-98 academic year.

The degree requirements include completion of the core courses, required rehabilitation counseling courses, and a 15 hour supervised clinical practice placement (internship) under faculty direction in a rehabilitation setting. The rehabilitation counseling program requires a minimum of 48 semester hours with a 3.0 grade-point average. The vocational evaluation program requires 54 semester hours with a 3.0 grade-point average. In addition to completing all course work and the internship satisfactorily, a candidate must demonstrate the ability to assume the responsibility required of a professional counselor and the personal characteristics essential to effective working relationships with others.

Rehabilitation degree programs are available for both full-time and part-time students. Contact the program coordinator for information concerning the availability of course work for students interested in part-time study.

Students may take the professional certification examinations to obtain national certification as a rehabilitation counselor or vocational evaluator during their internship semester. Graduates with two years or more of supervised experience after completion of their master's degree are typically eligible for licensure as a counselor in West Virginia following the successful completion of an appropriate counseling certification or licensing examination.

Counseling (COUN)

301. *Counseling Techniques*. I, II, S. 3 hr. PR: Consent. Development and application of basic counseling skills including interviewing, clinical observation, and a general orientation to counseling settings. Evaluation will be based on strengths and deficits in intra- and interpersonal skills and on demonstration of counseling skills in checkout situations. In setting laboratory experience required.

305. *Theory and Practice of Human Appraisal*. I, II, S. 3 hr. An overview of standardized evaluation methods commonly utilized in educational and rehabilitation settings. Experience is provided in selection, administration, and interpretation of selected instruments.

306. *Counseling Theories*. II, S. 3 hr. PR: COUN 301 and consent. A study of counseling approaches commonly used in public schools, colleges, and rehabilitation agencies. Application of theory emphasized.

Rehabilitation Counseling (REHB)

300. *Introduction to Rehabilitation Services*. I. 3 hr. PR: Consent. Introduction to comprehensive rehabilitation, its history and development as a philosophy process, and professional area. Professional and ethical issues in rehabilitation counseling. Other services involved in various rehabilitation settings.

310. *Medical Aspects of Rehabilitation*. II. 3 hr. PR: Consent. An overview of medical aspects and implications of disability for the handicapped person in the rehabilitation process. Studies of the more common severe disabilities and their remediation also will be included.

312. *Psychological Aspects of Disability*. II, S. 1-3 hr. PR: REHB 310; graduate standing and consent. The impact of disability considering cultural, interpersonal, and intrapersonal factors. Methods of assisting persons to adjust to problems of disability.

314. *Special Problems in Rehabilitation*. I, II. 3 hr. PR: Graduate standing and consent. Rehabilitation theory and techniques in problems such as blindness, epilepsy, and mental retardation. Concentrated study in special institutes.

320. *Career Development and Job Placement*. II. 3 hr. PR: Consent and graduate standing in social sciences or education. Principles and methods involved in the vocational counseling and placement of disabled persons. The use of occupational and educational information. Theories of career development, occupational analysis, and job placement in rehabilitation.

321. *Vocational Evaluation Systems and Techniques*. II. 3 hr. PR: REHB 300. An introduction to vocational evaluation. Formal and informal vocational evaluation systems and procedures will be explored with the goal of preliminary development of individualized evaluation plans.

322. *Advanced Vocational Evaluation Techniques*. S. 3 hr. PR: REHB 321. Advanced vocational evaluation systems including empirically based and informal systems will be studied. Emphasis will be on administration, scoring and interpretation, particularly as it relates to handicapped populations with specific evaluation problems.

323. *Seminar in Vocational Evaluation Services*. S. 3 hr. PR: REHB 321 and consent. Supervisory and professional issues in vocational evaluation services with an emphasis on standards, methods, procedures and resources for developing and maintaining vocational evaluation services.

374. *Field Work in Rehabilitation*. I, II, S. 1-6 hr. PR: Consent. Supervised field work experience in rehabilitation settings to provide rehabilitation counseling students with a more adequate orientation to their profession.

391. *Advanced Topics*. I, II, S. 1-6 hr.

462. *Clinical Conference in Vocational Rehabilitation*. II. 3 hr. PR: REHB 300, graduate standing, and consent. Exploration and evaluation of current methods of service delivery to vocational rehabilitation clients. Analysis and integration of service systems and the needs of the disabled client.

472. *Counseling Practicum*. I, II, S. 1-4 hr. PR: Graduate standing, liability insurance, and consent. Supervised experience in the application of counseling techniques in the rehabilitation process. Demonstration of high professional standards, counseling skills, and personal characteristics appropriate to the counseling relationship are essential.

475. *Clinical Practice*. 1-15 hr. PR: Consent, following at least one academic semester in the classroom. Clinical practice (internship) in selected agencies, rehabilitation centers, clinics, or hospitals conducting an organized program of services for the physically, mentally, emotionally, or socially handicapped. Practice will be under direct supervision of faculty and agency personnel.

480. *Seminar*. I, II, S. 1-12 hr. PR: Consent. Administration of programmatic research; legal and ethical issues in research and service programs, etc.

481. *Special Topics*. I, II, S. 1-6 hr. PR: Consent. Contemporary issues in the behavioral sciences and rehabilitation.

482. *Workshop in Rehabilitation*. I, II, S. 1-12 hr. PR: Consent. Supervision in the counseling process; vocational evaluation in rehabilitation; utilization of rehabilitation research; contemporary issues in rehabilitation.

490. *Teaching Practicum*. I, II, S. 1-3 hr. PR: Consent. Intended for graduate students with college teaching responsibility. Provides a supervised experience in a teaching situation. (Graded S or U.)

491. *Advanced Study Project in Rehabilitation Education*. I, II, S. 3-6 hr. Research for the program leading to the certificate of advanced study in education.

496. *Graduate Seminar*. I, II. 1 hr. PR: Consent. Opportunity for the advanced graduate student to present the student's research to faculty and/or student groups.

497. *Research*. I, II, S. 1-15 hr.

499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking course work credit, but who wish to participate in academic programs.

Secondary Education

R. Jerrald Shive, Department Chairperson, Curriculum and Instruction

602 Allen Hall

Degree Offered:

Master of Arts

Program

The Department of Curriculum and Instruction offers graduate programs and opportunities for research leading to the degrees of master of arts, and doctor of education for professional educators and other professionals for whom advanced study in curriculum and instruction and educational responsibilities is important. Areas of emphasis include secondary education, higher education, and librarian-media education.

The major emphases in all programs are curriculum and instruction. Optional tracks in specific subject and program areas are available. Programs are planned jointly by the student, the student's advisor, and the student's committee to meet the career needs of

the student. In addition to the general requirements of the University and the College of Human Resources and Education, a core of courses or course areas and supporting competencies is required of all graduate students in the department.

Master of Arts in Secondary Education

The College of Human Resources and Education offers a master of arts program in secondary education for persons who teach or work in teaching-related situations with adolescents and adults. The purpose of the program is to provide academic experiences to increase skills in teaching and curriculum development and knowledge of a teaching specialization. The program provides the opportunity to specialize in working with students in junior, middle, and high schools and with adults in post-secondary settings. Electives are used to provide a solid basis in the subject area that the student teaches. With advisor approval, electives may also be used to enhance students' personal goals. While teacher certification is not a part of the master's program, students may be able to complete some courses required for certification while working on a graduate degree.

For further information on admission and program requirements, write Chairperson, Curriculum and Instruction, WVU College of Human Resources and Education, 602 Allen Hall, P.O. Box 6122, Morgantown, WV 26506-6122. All applicants must comply with the requirements of the College of Human Resources and Education.

Secondary Education	Hours		
	A*	B**	C***
Graduate Courses in Education Program			
C&I 304	3	3	3
ED F 320 or 340	3	3	3
Approved course in Curriculum/Instruction			
in student's content field	3	3	3
Approved course in General Teaching Strategies			
or General Curriculum Development	3	3	3
ED P 320	3	3	0
C&I 391	0	3	0
C&I 497	6	0	0
Approved Education Electives	0	3	6-12
Approved Graduate Courses Outside of			
Education	9	9	12-18
	30	30	36

* Thesis required.
** Problem required.
*** 36 semester hour course work program.

Advisor will provide lists of courses which may be selected, usually courses in the student's content speciality.

Higher Education Curriculum and Teaching	Hours
Graduate Courses in Education	18-24
Required Courses in Education	15
ED F 320 or ED F 340	3
C&I 307	3
C&I 387	3
C&I 489	3
ED P 300	3
Approved Education Electives	3-9
Graduate Courses in an Academic Area	12-18
Total	36

A combination of undergraduate courses and courses in the graduate program is necessary to meet certification requirements.

Librarian/Media Specialist

	Program A ¹	B ²
Required Courses in Education Program		Hours
C&I 301	3	3
C&I 304	3	3
C&I 387	3	3
ED F 320 or ED F 340	3	3
Courses in Library Science	24	12 ³
Approved Electives	0	12
Total	36	36

¹For those desiring certification as school media specialist K-12. Specific courses in library science are required. For further information, see section on library science.

²For those who already have certification.

³Graduate courses other than those required for certification.

Curriculum and Instruction (C&I)

205. *The Junior High School*. I, II, S. 2 hr. PR: Consent. Developing philosophy, program, and practices of the junior high school.

224. *Approaches to Teaching Language*. II. 2 hr. PR: LING 1 and ENGL 111. Designed for prospective teachers of English and language arts. Focus is upon planning and implementing methods of teaching English as a language. Materials and resources appropriate to public school instruction are analyzed and utilized.

225. *Approaches to Teaching Literature*. II. 2 hr. PR: Junior standing. Designed for prospective teachers of English and language arts. Course focuses upon methodologies for teaching literature in public schools. Workshop format will provide opportunities for peer teaching activities as students apply methods of teaching literature.

280. *Special Problems and Workshops*. I, II, S. 1-4 hr. (Maximum of 8 semester hours may be applied toward the master's degree.) PR: 14 hr. in education. Credits for special workshops and short intensive unit courses on methods, supervision, and other special topics.

287. *Advanced Clinical Experience*. I, II, S. 1-6 hr. PR: Consent. Clinical experience in teaching-learning situations at any level.

300. *U.S. Education for International Students*. I. 3 hr. PR: International students with graduate status and developing oral and written English skills. To assist international students in understanding the U.S. system of education. Included: dominant U.S. values related to education; structure of U.S. education at all levels; models and strategies; field trips; international comparisons.

304. *The Secondary School Curriculum*. I, II, S. 3 hr. PR: High-school teaching experience or consent. Emphasizes socioeconomic and cultural influences on the curriculum; principles of curriculum development; curriculum building in the various teaching fields; techniques of experimentation and evaluation; and practice in curriculum building with special emphasis on unit construction.

306. *Curriculum for Middle Childhood*. I, S. 3 hr. Survey course which includes: historical, social, and cultural influences on the curriculum; the learner characteristics; curriculum and instructional organization and their relationship to facilities available; evaluation and implementation of middle childhood curriculum.

308. *Introduction to Alternative Learning Environments*. (Alternate years.) 3 hr. This course will provide opportunities for educators to explore and analyze the trends and issues in alternative learning environments in public education.

309. *Experiences in Alternative Learning Environments*. S. (Alternate years.) 6 hr. PR: C&I 308, ED F 320, consent. This course helps teachers to learn and practice the skills that are needed to be an effective teacher in an alternative teaching environment.

323. *Contemporary Issues in English Education*. I. 3 hr. PR: Graduate standing. Provides the student with a knowledge of several contemporary issues in English teaching which have immediate and long-range ramifications for secondary-school English instruction. 1 hr. lec., 2 hr. seminar.

324. *Advanced Methods in English Education*. II. 3 hr. PR: Graduate standing. (For classroom teachers of English.) Will involve an analysis of recent trends and innovations in methodology. Readings and discussions will lead to the development of instructional strategies and units for secondary English classrooms. 1 hr. lec., 1 hr. lab., 1 hr. seminar.

333. *Corrective Techniques in Mathematics Education*. I, S. 3 hr. PR: Consent. Materials and methods used in diagnosis and remediation of learning difficulties in mathematics.

334. *Mathematics in the Secondary School*. I, S. 3 hr. PR: Consent. Patterns of mathematics curriculum in the secondary school; practices in teaching mathematics; preparation, selection and use of instructional materials. Designed for the practicing secondary mathematics teacher.

337. *Mathematics in the Junior High School and Middle School*. II. 3 hr. PR: 6 hr. college mathematics or consent. Study of teaching of mathematics in the junior high school and/or middle school; application of mathematics content to teaching; instructional techniques and materials.

354. *Social Studies in the Secondary School*. S. 3 hr. PR: Consent. Nature and function of social studies in the secondary school; utilization of community, state, national, and world resources in teaching; selection of content for teaching purposes; curriculum construction with emphasis on resource and teaching units.

357. *Principles of Economic Education*. S. 3 hr. Workshop for principals, teachers, and supervisors with emphasis on the economic structure of our society and methods of integrating economics into the school program. (Sponsored jointly by College of Human Resources and Education and College of Business and Economics.)

359. *Classroom Simulation Techniques*. II, S. (Alternate years.) 3 hr. To provide experience in the use of learning games and simulations as an instructional technique and the opportunity to develop—under supervision—simulated activities and games to be used in a variety of learning environments.

373. *Professional Development*. I, II, S. 1-6 hr. (May be repeated.) PR: Department approval. Specially designed experiences for those interested in advancing professional

skills in a particular specialty. Not for degree credit in programs in the College of Human Resources and Education. (Graded as S or U.)

377. *Children's Television: Problems and Potentials*. S. 4 hr. PR: Consent. Provides parents and teachers with strategies for monitoring, evaluating, and directing television viewing habits of youth; pertinent research studies, school and community action programs, and home and school education programs are discussed and practiced.

380. *Special Topics*. I, II, S. 1-6 hr. PR: Consent.

383. *Seminar*. I, II, S. 1-6 hr. PR: Consent.

385. *Supervision of Student Teachers*. I, II, S. 3 hr. PR: Consent. For persons working or intending to work with education students in field experiences. Course focuses on the development and application of supervisory skills involved in effective guidance of student teachers and education students.

386. *Teaching Strategies for Middle Childhood*. II, S. 3 hr. Surveys instructional strategies appropriate for facilitating preadolescent learning. Including the role of the teacher, how the teacher uses resources within and outside the classroom as they relate to instruction of the learner ages 10-14 years.

387. *Advanced Teaching Strategies*. I, II, S. 3 hr. PR: Graduate standing. Deals with methods as one critical variable in teaching. Examines the ways and means to describe, plan the use of, implement and evaluate teaching methods. Analysis and implementation of teaching methods and component skills of teaching.

388. *Classroom Organization and Management*. I, S. 3 hr. Discusses research identifying components of classroom organization and environment which influence learning; reviews teacher behaviors and learning activities which research indicates lead to more effective teaching. Stresses implementation strategies relevant to classroom settings.

389. *Cultural Diversity in the Classroom*. I, S. 3 hr. PR: Graduate standing or consent. Provides opportunities for educators to increase awareness of their own ethnic backgrounds, foster understanding of the interactive effects of gender, race, ethnicity, and socio-economic status, and develop appropriate teaching materials and methods.

391. *Advanced Topics*. I, II, S. 1-6 hr.

395. *Practicum*. I, II, S. 1-12 hr. per sem. or session—aggregating not more than 12 hr. PR: 9 graduate hours in education. Enrollment with permission of advisor or instructor in consultation. Special individual and group projects. To provide appropriate residence credits for special workshops, prolonged systematic conferences or problems and projects in education.

401. *Curriculum Development*. I, II, S. 3 hr. PR: Consent. The study of the concepts underlying school curriculum.

407. *Theories, Models and Research of Teaching*. II, 3 hr. PR: EDF 320 or consent. The theories behind selected models of teaching as well as research in teaching and best practices.

408. *Contemporary Determinants of Curriculum*. II, S. 3 hr. PR: C&I 307 and ED F 340 or consent. Contemporary determinants of curriculum development.

409. *Curriculum Theories*. I, II, S. 3 hr. PR: C&I 408 or consent. Theories underlying curriculum from the past to the present and projected to the future.

410. *Advanced Supervision*. 3 hr. PR: Consent. Exploring theories, research, and practice of pre-service and in-service instructional supervision in the classrooms of novice and mature teachers. (Also listed as ED A 410.)

438. *Survey of Major Issues in Mathematics Education*. II, S. 3 hr. PR: Consent. Individual and group research on selected topics in mathematics education.

457. *Social Studies Curriculum Development, K-12*. I. 3 hr. PR: C&I 301 or 304 and C&I 350 or 354. Stresses the application of principles and procedures pertinent to the development of social studies programs in elementary and secondary schools. Strong emphasis will be placed on the analysis of current social studies curriculum materials.

460. *Planning Programs and Courses for Vocational Agriculture Department*. I, S. 2 hr. PR: C&I 188. Gathering data, studying the farming problems of all-day students, young farmers, and adult farmers, and planning the total program for the department.

487. *Teaching Effectiveness*. 3 hr. PR: Advanced graduate standing or consent. Explores twentieth century ideas/attitudes toward effective teaching from a variety of perspectives; investigates understandings of teacher, learner, content and environment; examines how questions asked reveal thinking regarding interaction of elements of teaching/learning situation.

488. *Higher Education Curriculum*. II. 3 hr. An analysis of evaluation of post-secondary curriculum with emphasis on organizing, translating, and applying findings. Topics include curriculum-shaping forces; institutional patterns; policy, components and change; and principles and techniques of development, experimentation, and evaluation.

Special Education

Wilfred D. Wienke, Program Coordinator
504 Allen Hall

Degrees Offered:

Master of Arts, Area of Emphasis for Doctor of Education

The program leading to the M.A. in special education is designed to prepare master-clinical teachers of children and adults with special needs and to provide initial training for the preparation of future supervisors and administrators of public-school special education programs. The College of Human Resources and Education awards the Certificate of Advanced Study and the Doctor of Education; both may include an emphasis in special education. The post-master's special education track leading to the Certificate of Advanced Study is individually prescribed, designed to prepare persons for positions as program specialists, consultants, supervisors, and administrators of programs or agencies providing special education or associated special services. The Ed.D. with emphasis in special education is an individually prescribed program designed to prepare persons for roles in special education personnel preparation, supervision, administration, and applied research. The programs also prepare professionals for emerging roles associated with interdisciplinary services to persons requiring special education, resources, or support for enhanced development. A particular focus of the program is the delivery of services in rural areas.

Application

All applicants must comply with University, College, and program requirements. The teacher certification requirements are based on the 1985 Policy 5100 *Standards for Certification*.

Program Options

- Behavioral disorders (K-12)
- Early intervention (pre-school handicaps) (Pre K-K)
- Gifted education (K-8; 5-12)
- Mental impairments (mild and moderate) (K-12)
- Severe/multiple disabilities (severe/profound handicaps)

Admission

All students seeking certification and/or a degree must be admitted into the special education program. Students are admitted as regular, provisional, or non-degree students as follows:

Regular status: The individual who meets all admission requirements is granted regular status as a certification and degree seeking student.

Provisional status: The individual who has an earned baccalaureate degree from a regionally accredited college or university but who does not meet admission requirements may be granted provisional status in the program. This status allows the student an opportunity to remediate deficiencies in grade-point average or other requirements in order to achieve regular status. This status is most commonly afforded students with either no or insufficient training in education. Deficiencies must be made up within the first 18 hours of program credit.

Non-degree status: The individual who has an earned baccalaureate degree and teaching certificate from a regionally accredited college or university but who does not seek the master's degree may be admitted as a non-degree student. This status allows the student to take courses for professional development and for additional professional endorsement.

Regular status admission to the programs occurs when the following admission criteria have been met:

- An earned baccalaureate degree from a regionally accredited college or university.
- A minimum grade-point average of 2.75.
- Teaching certification in early or elementary education (except in severe/multiple disabilities or early intervention).

Certification

For certification in K-12 programs, holders of a valid professional teaching certificate for elementary education or early childhood education must fulfill the core area requirements and the teaching certification requirements for their program area. Holders of professional teaching certificates in other areas, such as secondary education, must achieve an acceptable level of performance, as designated by the West Virginia Department of Education, on the multi-subjects content specialization test and fulfill the core area requirements and the teaching certification requirements for their program area. All applicants for certification must pass the consent specialization in their area of specialization (except severe/multiple disabilities).

Students who do not have a valid professional teaching certificate but who want certification in the various special education areas of specialization must meet the following criteria:

• Students must achieve an acceptable level of performance, as determined by the State Department of Education and/or the College of Human Resources and Education, on the multi-subjects content specialization test except in gifted education, severe/profound handicaps, or early intervention.

• Students must satisfy the teaching certification requirements for their program area, including the core courses.

Students who do not achieve an acceptable level of performance on the multi-subjects content specialization test may take this test a second time. If they do not achieve the requisite score on the second try, they will no longer be considered candidates for the program.

Students who do not meet skill/proficiency score requirements for admission may choose to avail themselves of the numerous remediation options available on campus. These include the Reading Clinic, the Microcomputer Laboratory, and the Learning Center.

Practicum

To be eligible for practicum, students must meet the following requirements:

- Admission to the special education program and completion of all required course work in the area of specialization with an overall GPA of 3.0.
- Application for practicum submitted prior to midterm of the semester immediately preceding the one for which practicum is planned.
- Applicable criteria for one of the currently available practicum options.

Consult program for a complete list of practicum eligibility requirements.

Performance is assessed during course work and practicum experiences. A student who fails to achieve an acceptable level of performance in practicum will have his or her individual performance deficits reviewed and will be given the opportunity to repeat practicum once; such repetition may occur following completion of an indicated remediation and/or additional instruction. A student who does not meet acceptable levels of performance in the second practicum assignment is asked to withdraw from the program.

Retention in a program requires an overall 3.0 GPA.

Graduation Requirements

To be eligible for graduation, students must meet the following requirements:

- Completion of all required courses in the program of study with an overall GPA of 3.0.
- Passing score on the content specialization test in their area of specialization (except severe/multiple disabilities).
- Enrollment in course work during the semester in which graduation is planned.
- Application for graduation submitted prior to midterm of the semester for which graduation is planned.

Applicants interested in one of the department program areas should contact the special education chairperson for specific information on schedule and location of courses.

Curriculum Core

Master of Arts (36 Semester Hours Minimum)

A. Core Area Requirements (BD, LD, MI)	Hours
(12 semester hours in all master's degree programs)	
SPED 300 <i>Introduction to Special Education</i>	3
SPED 301 <i>Special Education Curriculum and Methods</i>	3
SPED 302 <i>Special Education Assessment</i>	3
SPED 303 <i>Classroom/Behavior Management:</i>	
<i>Special Education</i>	3
Total	12

B. Teacher Certification Behavior Disorders Area Requirements	
SPED 340 <i>Introduction to Behavior Disorders</i>	3
SPED 342 <i>Teaching Strategies: Behavior Disorders</i>	3
SPED 487 <i>Practicum: Behavioral Disorders</i>	3-6
Total	9-12
C. Teacher Certification Learning Disabilities Area Requirements	
SPED 330 <i>Introduction to Specific Learning Disabilities</i>	3
SPED 332 <i>Teaching Strategies: Specific Learning Disabilities</i>	3
SPED 487 <i>Practicum: Learning Disabilities</i>	3-6
Total	9-12
D. Teacher Certification Mental Impairments (Mild to Moderate) Area Requirements	
SPED 360 <i>Introduction to Mental Retardation</i>	3
SPED 362 <i>Teaching Strategies: Mental Retardation</i>	3
SPED 487 <i>Practicum: Mentally Retardation</i>	3-6
Total	9-12
E. Teacher Certification Gifted Education Area Requirements	
SPED 300 <i>Introduction to Special Education</i>	3
SPED 302 <i>Special Education Assessment</i>	3
SPED 370 <i>Introduction to Gifted Education</i>	3
SPED 372 <i>Teaching Strategies: Gifted Education</i>	3
SPED 487 <i>Practicum: Gifted Education</i>	3-6
Total	15-18
F. Additional Requirements for Master's Degree	
ED P 320 <i>Introduction to Research</i>	3
SPED 380 <i>Culminating Project</i>	3
SPED 382 <i>Computer Applications in Special Education</i>	3
Total	9
Planned Electives—(minimum for degree)	3-18
G. Teacher Certification Severe/Multiple Disabilities Area Requirements	
SPED 320 <i>Curriculum: Severe Disabilities</i>	3
SPED 322 <i>Characteristics and Methods: Physical Disabilities</i>	3
SPED 323 <i>Family/Professional Collaboration:</i>	
<i>Developmental Disabilities</i>	3
SPED 324 <i>Classroom-based Communication Intervention:</i>	
<i>Developmental Disabilities</i>	3
SPED 325 <i>Secondary/Adult Programming:</i>	
<i>Severe Disabilities</i>	3
SPED 327 <i>Assessment: Developmental Disabilities</i>	3
SPED 328 <i>Instructional Programming:</i>	
<i>Developmental Disabilities</i>	3
SPED 329 <i>Managing Challenging Behaviors: Severe Disabilities</i> ..	3
SPED 487 <i>Practicum: Severe/Multiple Disabilities</i>	6
Total	30

H. Teacher Certification Early Intervention/Preschool Handicaps	
Area Requirements	
SPED 319 <i>Typical/Atypical Development: Early Intervention</i>	3
SPED 321 <i>Curriculum: Early Intervention</i>	3
SPED 322 <i>Characteristics and Methods: Physical Disabilities</i>	3
SPED 323 <i>Family/Professional Consultation: Developmental Disabilities</i>	3
SPED 324 <i>Classroom-based Communication Intervention: Developmental Disabilities</i>	3
SPED 326 <i>Program Management: Early Intervention</i>	3
SPED 327 <i>Assessment: Developmental Disabilities</i>	3
SPED 328 <i>Instructional Programming: Developmental Disabilities</i>	3
SPED 487 <i>Practicum: Early Intervention</i>	6
Total	30
Planned Electives (minimum for degree)	6

I. Problem or Thesis Area Requirements	
ED P 320 <i>Introduction to Research</i>	3
SPED 395 <i>Problem in Special Education or SPED 497 Research</i>	3-6
SPED 391 <i>Advanced Topics</i>	3
Total	9-12
Elective Requirements	12-15

Electives are to be approved by the student's advisor.

Certificate of Advanced Study (C.A.S.)

All applicants must comply with the requirements of WVU, the College, and the program. Additional admission requirements are as follows:

- Completion of a master's degree related to special education.
- Submission of scores of the Millers Analogies Test or the Graduate Record Examination.

- Evidence of successful approximately selected work experience.
- Three positive letters of recommendation.
- Statement of goal of program study.
- Plan of study approved by advisor.

Areas of Specialization

Advanced study may be in any one or combination of areas represented in the program including: behavior disorders, learning disabilities, gifted education, mental impairments, severe/multiple disabilities, and early intervention.

Program of Studies

Courses/Course Areas	Hours
SPED 480 Seminar in Special Education	3
SPED 365 Administration and Supervision of Programs for Exceptional Children	3
Individually prescribed course work in special education including goal-related areas	18
Research including SPED 491 Advanced Study: Project in Special Education	6
Total (minimum)	30

Doctor of Education

All applicants must comply with the requirements the University, the College, and the program. Additional entrance requirements are as follows:

- Completion of a master's degree and teaching certification in special education or disability services.
- Graduate grade-point average of 3.5.
- Three letters of reference addressing the candidate's past performance and qualities which would make the person suitable for doctoral-level study.
- Two years of work experience in special education or disability services.
- Submission of Graduate Record Examination or Miller Analogies scores in support of potential for success in doctoral-level study.
- Well defined goal statement.

Admissions are open year round and inquiries should be addressed to Chairperson, Doctoral Admissions Committee, Special Education Program, College of Human Resources and Education, West Virginia University, P.O. Box 6122, Morgantown, WV 26506-6122.

Program of Study

Programs of study comply with all applicable institutional requirements, but typically they include course work in excess of the minimum college requirements because of the clinical nature of special education. Programs are designed by the doctoral student, the student's advisor, and the doctoral committee to best meet the student's career goals.

The leadership training provided through this program of studies draws on the many available strengths and resources of a major university. Development of research skills is a major focus of the program, along with advanced training related to the education, development, and habilitation of persons with exceptional needs. Normally, students take course work in a number of programs and colleges in order to take advantage of available interdisciplinary resources. The program encourages study and involvement with faculty from a broad range of disciplines in order to best prepare doctoral students to meet their individual career aspirations as leaders in special education.

Special Education (SPED)

300. *Introduction to Special Education*. 3 hr. Comprehensive overview of exceptionalities which require special education. (3 hr. lec.)

301. *Special Education Curriculum and Methods*. 3 hr. Educational needs of students with mild/moderate learning problems in the categorical areas of retardation, behavior disorders, and learning disabilities. (3 hr. lec.)

302. *Special Education Disabilities*. 3 hr. Focuses on evaluation of curricula and programs for severe and multiple disabilities. Task analysis and programming of longitudinal skill sequences are discussed for the following skill areas: pre-academics, academics, motor, self-help, and social.

303. *Classroom/Behavior Management: Special Education*. 3 hr. Theory and classroom application of procedures to implement behavior changes in children with mild/moderate handicaps and problems; effective group and individual behavior management. (3 hr. lec.)

319. *Typical/Atypical Development: Early Intervention*. 3 hr. Characteristics of atypically developing children from birth through age six; causes and correlates of developmental

delays and disabilities and at risk conditions during the prenatal, perinatal, and postnatal periods; and strategies for promoting child development in early intervention programs.

320. *Curriculum: Severe Disabilities* . 3 hr. Focuses on evaluation of curricula and programs for severe and multiple disabilities. Task analysis and programming of longitudinal skill sequences are discussed for the following skill areas: pre-academics, academics, motor, self-help, and social.

321. *Curriculum: Early Intervention*. 3 hr. Design, implementation and evaluation of curricula and educational programs for young children with developmental delays and disabilities and at risk conditions; programming of skill sequences in motor development, socioemotional development, cognitive development, and preacademic content areas.

322. *Characteristics and Methods: Physical Disabilities*. 3 hr. Characteristics and educational implications of physical, neurological, and sensory impairments along with positioning, handling, and other management strategies, selection, design and use of adaptive equipment, training programs for feeding, toileting, dressing, and motor skills.

323. *Family/Professional Collaboration: Developmental Disabilities* . 3 hr. Strategies and interpersonal skills for needs assessment, in-service training, conferencing, parental involvement, and interagency collaboration in educational programs for at-risk children, infants and preschoolers with delays, and persons with severe disabilities.

324. *Classroom-Based Language Intervention: Developmental Disabilities*. 3 hr. Design and implementation of training programs for at-risk children, infants and preschoolers, with delays, and persons with severe disabilities.

325. *Secondary/Adult Programming: Severe Disabilities*. 3 hr. Focuses on the education of secondary-level and adult severe and multiple disabilities . Methods and materials in areas of vocational training, home living, community living, recreational and leisure skills, and sex education.

326. *Managing Programs: Early Intervention*. 3 hr. Management skills to serve young children with disabilities of early intervention delays and at risk, including home-based, center-based, self-contained, and mainstreamed models.

327. *Assessment: Developmental Disabilities*. 3 hr. Principles and practices of assessment, legal and ethical issues, individualized educational programs for at-risk children, infants and preschoolers with delays, and persons with severe disabilities.

328. *Instructional Programming: Developmental Disabilities*. 3 hr. The design, delivery, and evaluation of instruction for at-risk children, infants and preschoolers with delays, and persons with severe disabilities.

329. *Managing Challenging Behaviors: Severe Disabilities*. 3 hr. Strategies for functional analysis, prevention, intervention, and crisis management, of self-injury, stereotypes, self-stimulation, noncompliance, and aggression; legal and ethical issues in management of problem behavior. (3 hr. lec.)

330. *Introduction to Specific Learning Disabilities*. 3 hr. Historical, etiological, educational, and legislative aspects of, and multidisciplinary approaches to students with learning disabilities.

332. *Teaching Strategies: Specific Learning Disabilities*. 3 hr. Curriculum planning, informal diagnosis, techniques, teaching strategies in specific areas, opportunities to use strategies in student designed programs.

340. *Introduction to Behavior Disorders*. 3 hr. Historical trends in the education of students with behavior disorders. Educational and behavioral management techniques and trends for the future.

342. *Teaching Strategies: Behavior Disorders*. 3 hr. Practical application of instructional methods for students with behavior disorders: assessment, management, and cognitive behavioral curriculum.

360. *Introduction to Mental Retardation*. 3 hr. Mental retardation from historical, etiological, and educational perspectives; the impact of PL94-142 on special education. (3 hr. lec.)

362. *Teaching Strategies: Mental Retardation*. 3 hr. Curriculum development based upon individual needs; application of classroom instructional methods for students with mild/moderate mental retardation.

365. *Administration and Supervision of Programs for Exceptional Children*. 3 hr. Administration and supervision with attention to: selection and placement procedures; facilities and equipment; local, state, federal legislation; and philosophy and recent research. (Consult program for course offering.)

370. *Introduction to Gifted Education*. 3 hr. An introductory course concerning characteristics of gifted and talented children and implications these factors have for education. Included will be definition, characteristics, history and philosophy of special programs, identification procedures, and development of program prototypes.

372. *Teaching Strategies: Gifted Education*. 3 hr. Development of qualitatively different educational experiences for gifted students. Models of differentiation in content, process, and product in academic areas.

380. *Culminating Project*. 3 hr. PR: ED P 320 and consent. Completion of master's program; projects in applied research, curriculum development, or program design serve as exit examinations. (3 hr. lec.)

381. *Special Topics*. 1-6 hr. PR: Consent. Special topics or research in mental retardation and in exceptional children and adults.

382. *Computer Applications in Special Education*. PR: Consent. 3 hr. Implementing computer assisted instruction in the special education classroom; the computer as a tool to prepare and monitor instruction. (3 hr. lec.)

391. *Advanced Topics*. 1-6 hr. PR: Consent.

395. *Problem in Special Education*. 3 hr. Research for master's degree in special education.

397. *Master's Degree Research or Theory*. 1-15 hr.

470. *Advanced Professional Knowledge: Special Education*. 3 hr. Advanced foundations of special education and disability services; historical trends and philosophical perspectives.

tives; comparative international practices; policy formulation and analysis; and advocacy roles and activities.

471. *Personnel Preparation: Special Education*. 3 hr. Design, delivery and evaluation of preparation programs in special education and disability services; observation, supervision and evaluation of student teaching and practicum experiences; issues and trends in special education personnel preparation.

472. *Professional Writing/Grant Writing: Special Education*. 3 hr. Writing for professional publication in special education and disability services; review and editing of the written works of others; grant writing and review for private foundations or state and federal agencies.

474. *Analyzing/Interpreting Research: Special Education*. 3 hr. Research literature in special education and disability services; formulation of research questions; translation of research questions into appropriate research designs and proposals.

478. *Technology Research/Training: Special Education*. 3 hr. Review of research for computer-assisted instruction and applied technology with special populations; use of computer tools for research and productivity in special education and disability services; authoring computer-based materials with hypermedia programs.

479. *Current Issues/Trends: Special Education*. 3 hr. Analysis, discussion and research review of contemporary issues and trends in special education and disability services; selecting and defending a position on a variety of legal, ethical, social and programmatic issues.

480. *Seminar*. I, II, S. 1-6 hr. PR: Consent. Special topics concerned with the educational, sociological, and psychological aspects of special education.

483. *Internship in Professional Instruction*. 1-9 hr. PR: SPED 471. Supervised experience in design, delivery and evaluation of a college course in special education or disability services.

484. *Internship in Practicum Supervision*. 1-9 hr. PR: SPED 471. Supervised experience in observing, supervising and evaluating student teacher performance in a practicum setting in special education or disability services.

485. *Internship in Research*. 1-15 hr. PR: SPED 474. Supervised experience in design, conduct, analysis and report preparation of empirical, applied or policy analysis research in special education or disability services.

487. *Practicum*. 1-12 hr. PR: Consent. Internship, advanced student teaching in each certification area, and administration and supervision practicum. (Graded as S/U.) (Available to eligible students only; consult program for guidelines.)

490. *Teaching Practicum*. 1-3 hr. PR: Consent. Intended for graduate students with college teaching responsibility. Provides a supervised experience in a teaching situation. (Graded as S/U).

491. *Advanced Study Project in Special Education*. 3-6 hr. Research for the program leading to the Certificate of Advanced Study in Special Education. (Consult program for course offering.)

496. *Advanced Seminar*. 1-6 hr. PR: Consent. Designed to permit graduate students an opportunity to present research to the assembled faculty and graduate study body. (Graded as S/U.)

497. *Research*. 1-15 hr.

498. *Thesis*. 2-4 hr. PR: Consent. (Graded as S/U.)

499. *Colloquium in Special Education*. 1-6 hr. PR: Consent. For graduate students not seeking course work credit, but who wish to participate in academic programs.

Speech Pathology and Audiology

Conrad Lundeen, Chairperson

805 Allen Hall

Degree Offered:

Master of Science

Admission

Students applying for programs leading to degrees in speech pathology and audiology must comply with general WVU requirements and the requirements of the College of Human Resources and Education and of the Department of Speech Pathology and Audiology.

The Speech Pathology and Audiology Graduate Affairs Committee accepts those applicants they believe will be successful in the graduate program. The number of applicants accepted depends upon the number of qualified applicants, the size of the speech pathology and audiology graduate faculty, and the facilities available for acceptable academic, clinical, and research training. A minimum overall undergraduate grade-point average of 3.0 is required for consideration for admission.

The master of science degrees in speech pathology and audiology are competency-based programs. Students are expected to achieve a minimum competency level of B or S in each required course. If a student receives a grade of C or U (or lower) in a required course, he/she must meet with his/her academic advisor and/or academic graduate committee before beginning additional course work. The course instructor in conjunction with the academic advisor or committee will recommend the appropriate steps to meet the minimum standards of professional competency.

Requirements

In addition to the requirements listed in the Human Resources and Education introduction, the M.S. in speech pathology and Audiology requires:

- A minimum of 42 semester hours of approved graduate courses (including six hours of clinical practicum) in speech and hearing sciences, speech-language pathology, audiology, and other related areas to attain professional competence;
- Three semester hours of clinical practicum during each regular semester and two additional semester hours of practicum during the summer; six of these hours count toward the 42 semester hour requirement.
- A 3.0 grade-point average for all courses taken for credit toward the graduate degree.
- Successful performance during the last semester of graduate study on the NESPA examinations.
- Demonstration of professional competence in speech and/or hearing as measured by fulfillment of the academic and clinical practicum requirements established by the faculty.

A minimum of five consecutive semesters (including summer sessions) is required for master's candidates with a background in speech and hearing. For candidates without a background in speech and hearing, a minimum of seven semesters is required for completion of the master's degree.

The Department of Speech Pathology and Audiology is accredited by the Educational Standards Board (ESB) of the American Association of Speech-Language Pathology and Audiology (ASHA) for both the speech-language pathology and audiology training programs.

Speech Pathology and Audiology (SPA)

210. *Manual Communication*. I, II. 3 hr. PR: Consent. Development of skills needed to communicate in sign language. Includes the manual alphabet, basic number concepts, and the basic vocabulary of traditional American signs.

212. *Intermed Manual Communication*. II. 3 hr. PR: SPA 210 or consent. Improve skills needed to communicate in sign language. Includes increasing sign language vocabulary, practicing fingerspelling, and communicating with signs.

218. *Hearing Screening Programs* I. 3 hr. PR: SPA 50 or consent. Disorders of hearing; screening programs from birth through geriatrics; introduction to industrial programs.

223. *Aural Rehabilitation*. II. 3 hr. PR: SPA 243 or consent. Communication and hearing impairment; aural rehabilitation evaluation; remediation including amplification, auditory and visual training, and ALD's.

243. *Audiological Assessment*. I. 4 hr. PR: SPA 151 and 218. Application of basic audiological techniques, including puretone and speech audiometry, masking, and emittance testing. Audiometric skill development in computer simulation lab.

250. *Communication Disorders*. I, II, S. 3 hr. (For Non-majors.) Survey of normal processes and disorders of speech, language, and hearing in children and adults. Intended for students and teachers in early childhood, elementary, secondary, and special education; language arts specialists; child development specialists; psychologists; and rehabilitation specialists.

254. *Language Acquisition*. II. 3 hr. PR: SPA 150 and 153. Normal processes involved in the acquisition of language, including the development of phonological, semantic, morphological, pragmatic, and syntactical systems. Application of these processes to the diagnosis and treatment of language disorders.

255. *Articulation and Cleft Palate*. II. 3 hr. PR: SPA 153. Characteristics and etiology of articulatory and phonological disorders; survey of diagnostic and therapeutic procedures. Characteristics of articulation and resonance, and survey of evaluation and treatment considerations for cleft palate.

256. *Voice and Stuttering*. II. 3 hr. PR: SPA 150 and 255. Basic knowledge about and understanding of voice disorders and stuttering; relevant theories, facts, research findings, and clinical practice related to the epidemiology, etiology, course, prevention, diagnosis, and remediation.

257. *Clinical Programs in Schools*. I. 3 hr. PR: SPA 254 and 255. Organization and structure of clinical programs in public school settings. Discussion of state and federal regulations, case selection, scheduling, program planning, and other administrative and programmatic matters.
258. *Language Disorders*. II. 3hr. PR: SPA 254. The nature and etiology of child and adult language disorders are described. Assessment and remediation procedures are examined.
265. *Parent Programs Comm Disorders*. I. 3 hr. Students will learn to organize and implement parent involvement programs in a variety of settings, interview parents, conduct conferences, utilize appropriate materials, and interact effectively with parents of communicatively handicapped children in various practical experiences.
278. *Clinical Observation/SLP*. I, II. 1 hr. PR: SPA 50 or consent. Introduction to clinical procedures and issues, including professional ethics, certification requirements, assessment/treatment process variables, clinical observations, behavioral objectives, and cues and feedback.
279. *Clinical Observation/Audiology*. I, II. 1 hr. PR: SPA 50 or consent. Introduction to clinical procedures and issues, including professional ethics, certification requirements, assessment/treatment process variables, clinical observations, behavioral objectives, and cues and feedback.
280. *Professional Writing/Speaking*. I. 3 hr. (For majors only). PR: ENGL 1, 2, SPA 80; or consent. Designed for improvement of student's professional skills, specifically oral and written. Emphasis is placed on report writing, letter writing, resume writing, listening, interviewing, group problem solving, leadership, persuasion, and public speaking.
282. *Clinical Practice/SLP*. I, II, S. 3 hr. PR: Consent. Orientation to clinical methods for evaluation and treatment of speech-language disorders.
283. *Clinical Practice/Audiology*. I, II, S. 3 hr. PR: Consent. Orientation to clinical methods for evaluation and treatment of hearing disorders.
285. *Hearing-Impaired School Child*. S. 3 hr. Audiology in the public school classroom; remediation for the hearing-impaired child.
305. *Rural Issues in Sp-Lang Path*. II. 2 hr. Presentation and discussion of issues related to the practice of speech-language pathology in rural school systems.
320. *Introduction to Research*. I. 3 hr. PR: Consent. Discussion of research including experimental design and data analysis in speech-language pathology, audiology and speech, language, and hearing sciences.
321. *Structure and Function of the Auditory System*. I. 3 hr. PR: Consent. Detailed study of the gross and microscopic anatomy of the auditory system, and detailed investigation of physiological aspects of auditory sensitivity and acuity.
322. *Advanced Audiological Assessment*. I. 3 hr. Various audiological techniques utilized in differential diagnosis of auditory dysfunction. Administration and interpretation of diagnostic techniques.

323. *Advanced Study: Aural Rehabilitation*. 3 hr. Identification of candidates for aural rehabilitation; evaluating degree of handicap; introduction to speech, language, education, and academic achievement of hearing impaired children; auditory, visual, and combined methods of rehabilitation; aural rehabilitation counseling. 3 hr. lec.

324. *Central Auditory Disorders*. 3 hr. PR: SPA 322 or consent. Pathology and audiometric site-of-lesion testing of the central auditory nervous system. 3 hr. lec.

325. *Hearing Aids*. I. 3 hr. PR: SPA 322. Electronic design of amplification systems and acoustics analysis of amplification systems. Hearing aid evaluation procedures.

326. *Pediatric Audiology*. S. 3 hr. A study of the development of the auditory response and hearing problems of early childhood. Student will learn the construction and application of specialized assessment techniques suitable for the pediatric patient.

327. *Pathologies of the Auditory System*. S. 3 hr. PR: Consent. Investigation of the nature and etiology of auditory system pathologies from the external ear to the auditory cortex and their audiological manifestation.

330. *Industrial and Environmental Audiology*. II. 3 hr. A study of various noise parameters, instrumentation for noise measurement, and measurement techniques. Effects of noise on man and industrial hearing conservation procedures discussed.

340. *Experimental Phonetics*. S. 3 hr. PR: SPA 150 and 151 or consent. Discussion of contemporary topics in the speech and hearing sciences, including acoustic, physiological, and perceptual phonetics.

341. *Adv. Hearing Science*. II. 3 hr. Audiological instrumentation and competency in calibration, maintenance, trouble shooting, minor repair, and use of instrumentation.

343. *Neurophys of Speech/Language*. 3 hr. PR: SPA 150, 258, or consent. General and typographic anatomy and physiology of CNS, with special attention to motor and sensory systems as they apply to speech, hearing, and language.

344. *Neuropath of Speech/Language*. 3 hr. PR: SPA 343. Explores methods of identifying and treating speech and language problems associated with nonprogressive and progressive neurological disorders.

350. *Speech and Language Disorders: Assessment-Remediation*. I, II. 3 hr. PR: SPA 250 or consent. Familiarizes the student with the following aspects of speech and language disorders: causes, characteristics, assessment, remediation techniques, and their incorporation into individualized educational programs.

351. *Advanced Voice Disorders*. I. 3 hr. PR: SPA 256 or consent. Advanced study of the vocal and respiratory mechanisms; epidemiology, classification, etiology, symptomatology, assessment, prevention, and remediation of voice disorders.

352. *Advanced Stuttering Disorders*. II. 3 hr. PR: SPA 256 or consent. Advanced study of the symptomatology, epidemiology, etiology, research findings, assessment, prevention, and remediation of stuttering and related fluency disorders.

353. *Adult Neurogenic Comm Dis.* II. 3 hr. PR: SPA 343. Explores normal adult language processes and the effect of normal aging on communication. Advanced investigation of the etiology, diagnosis, nature, and therapeutic approaches of aphasia, agnosia, apraxia, dysarthria, dementia, right hemisphere impairment, and traumatic brain injury.

355. *Advanced Study: Cleft Palate.* II. 3 hr. PR: SPA 255 or consent. Investigation of the etiology, diagnosis, nature, and therapy approaches of communicative disorders in persons with cleft palate.

356. *Phonological Disorders.* I. 3 hr. PR: SPA 255 or consent. Advanced study of the etiology, assessment, and treatment of phonological disorders in children and adults.

357. *Professional Issues.* II. 2 hr. PR: SPA 320 or consent. Discussion of contemporary professional issues in speech-language pathology and audiology.

360. *Language Disorders in Children: Assessment.* S. 3 hr. PR: SPA 254. Assessment procedures utilized to identify children with language disorders. Standardized tests and non-standardized analysis procedures are introduced.

361. *Language Disorders in Children: Treatment.* S. 3 hr. PR: SPA 360 or consent. Treatment procedures for children with language disorders are presented. Clinician-oriented and client-oriented approaches are emphasized.

370. *Augmentative/Alternative Comm.* I. 3 hr. Discussion of augmentative/alternative communication options for persons who are unable to meet their daily needs through natural modes of verbal, manual, or written communication. Demographics, assessment, and treatment of candidates for AAC interventions.

371. *AAC Technology.* II. 3 hr. PR: SPA 370 or consent. Provides training and experience in the utilization of augmentative/alternative communication technology for persons who are unable to meet their daily needs through natural modes of verbal, manual, or written communication.

373. *Professional Development.* I, II, S. 1-6 hr. (May be repeated for credit.) PR: Department consent. Specially designed experiences for those interested in advancing professional skills in a particular specialty. (Graded as S/U. Not for degree credit in programs in the College of Human Resources and Education.)

382. *Adv Practice/SLP.* I, II, S. 1-6 hr. PR: Consent. Supervised clinical practicum that concerns the evaluation and treatment of children and adults with speech-language disorders.

383. *Adv Practice/Audiology.* I, II, S. 1-6 hr. PR: Consent. Supervised clinical practicum that concerns the evaluation and treatment of children and adults with hearing disorders.

384. *Externship in Speech Pathology/Audiology.* I, II, S. 1-9 hr. Supervised clinical practicum experience in selected work settings to provide students with a concentrated orientation to the professional work place. Coordination and evaluation is under the direction of faculty.

387. *Special Topics.* I, II, S. 1-6 hr. (May be repeated for credit.) PR: Consent. Open to graduate students in speech pathology and audiology who are pursuing independent problems in that field.

480. *Seminar*. I, II, S. 1-6 hr. PR: Consent. Topics vary from semester to semester to meet student needs. Organic speech impairment, speech pathology research, aural rehabilitation research, medical audiology research, etc.

497. *Research*. I, II, S. 1-15 hr.

499. *Colloquium*. 1-6 hr. PR: Consent. For graduate students not seeking course work credit but who wish to retain all the rights and privileges of duly enrolled students. Enrollment entitles students to consult with graduate faculty, use the University's facilities, and participate in its academic and cultural programs. Colloquium credits may not be counted towards Masters' requirements. Grading is S/U.

Technology Education

David L. McCrory, Chairperson

706 Allen Hall

Degree Offered:

Master of Arts

The program includes the study of technology, the relation of technical systems to the civilization process, and the implications of changes in these systems on the quality of life and the education of citizens. Technology, in its simplest definition, is the study of human techniques for making and doing things, and is primarily concerned with the when, where, how, and why of such techniques, interpreting them in a social context. The goal of the program is an increased level of understanding about technological systems in order to provide the basis for controlling, directing, and redirecting these systems for the benefit of humankind. Faculty and students in the program are committed to a continuing investigation of the impact of technology on people and society — including education and the environment. Because such an interdisciplinary study of technology dictates a wide exposure to other disciplines, students are encouraged to take advantage of educational opportunities in other departments within the university community.

Students from all regions of the United States and several other countries are engaged in graduate study at the master's or doctoral level. Their undergraduate preparation varies, ranging from technical fields such as engineering, industrial technology, industrial arts, and journalism to fields such as speech communication, art, and theology.

The program is involved in the Academic Common Market of the SREB (Southern Regional Education Board). Students from the southern region (thirteen southern states) should inquire about instate tuition. Graduate assistantships are frequently available at both the master's and doctoral levels. Information is available upon request.

Admission

All applicants must comply with the general WVU requirements and the requirements of technology education. Admission to the program is contingent upon assessment of official transcripts of all higher education work attempted, letters of recommendation, and the Miller Analogies Test or Graduate Record Examination.

In addition to the study of the interaction between technology and culture, the department has three major technical areas of concentration. Students are expected to focus their course of study on one of these areas:

- Communication and Information Systems—Study of visual, acoustical, telecommunication, and computer systems including the analysis of information transfer and its social/cultural impact.

- **Transportation Systems**—The study of air, space, terrestrial, and marine systems, including components and social, cultural and environmental impacts.

- **Production Systems**—The study of manufacturing, construction, and processing systems, including the social/cultural impact of the industrial revolution, automation, and cybernation.

Students may also include in their plans of study special themes related to technology including appropriate technology, curriculum and instructional design in the technologies, energy, environment, international development, public policy, technology assessment, technology and culture, and technology transfer.

Master's Areas of Emphasis

The master's degree enables students to select an emphasis of study based on their individual interest, goals, and objectives within the cohesive theme of the study of technology. The program culminates in a master of arts degree in technology education.

Each student's program of study outlines the major courses and activities which the student pursues while engaged in graduate study. It is designed by the student in consultation with a faculty advisor. Programs of study are developed with concentrations in professional development, communication and information systems, or technology and society. Specific emphasis can be placed in areas such as appropriate technology and international or community development.

All master's programs have requirements related to the discipline as well as areas of specialization. Typical master's degree program requirements are ten core credits, 15 credits in the area of the specialization, and 12 credits in the area of research. Specific courses and activities in each of these categories are listed as follows:

Communication And Information Systems

Core Courses

Semester Hours	Required/Elective
T E 281 <i>Introduction to Technology</i>	3
T E 344 <i>Technology and Society</i>	3
T E 384 <i>Interdisciplinary Seminar</i>	1
T E 496 <i>Graduate Seminar</i>	1
Total	10

Specializations

T E 215 <i>Introduction to Computers*</i>	3
T E 216 <i>Computer Applications</i>	3
T E 217 <i>Basic Programming</i>	3
T E 310 <i>Contemporary Problems in Communication</i>	3
T E 311 <i>Technical Development in Communication</i>	3
T E 372 <i>Development of Instructional Materials</i>	3
T E 385 <i>Practicum: (a) internship in business, or (b) curriculum development</i>	3
T E 390 <i>Special Topics: Distance Education</i>	3
T E 390 <i>Special Topics: Videotext Systems</i>	3
Totals	6 9**

Research

ED P 320 <i>Introduction to Research</i> ^{***}	3
ED P 330 <i>Foundations of Educational Measurement</i> [†]	3
T E 397 <i>Master's Degree Research</i>	6
Total	12
Totals	28 9
Total Minimum Semester Hours	37

Professional Development

Core Courses

T E 281 <i>Introduction to Technology</i>	3
T E 344 <i>Technology and Society</i>	3
T E 384 <i>Interdisciplinary Seminar</i>	3
T E 496 <i>Graduate Seminar</i>	1
Total	10

Specializations

T E 300 <i>Contemporary Problems in Transportation or</i> T E 301 <i>Technical Developments in Transportation</i>	3
T E 310 <i>Contemporary Problems in Communication or</i> T E 311 <i>Technical Developments in Communication</i>	3
T E 320 <i>Contemporary Problems in Production or</i> T E 321 <i>Technical Developments in Production</i>	3
T E 371 <i>Technology Education Curriculum Development</i>	3
Electives	6
Total	9 6 [†]

Research

ED P 320 <i>Introduction to Research</i> [†]	3
ED P 330 <i>Foundations of Educational Measurement</i> [†]	3
T E 397 <i>Master's Degree Research</i>	6
Total	12
Totals	31 6
Total Minimum Semester Hours	37

Technology and Society

Core Courses

T E 281 <i>Introduction to Technology</i>	3
T E 344 <i>Technology and Society</i>	3
T E 384 <i>Interdisciplinary Seminar</i>	3
T E 496 <i>Graduate Seminar</i>	1
Total	10

Specialization

T E 245 <i>Women in International Development</i>	3
T E 280A <i>Shelter Design</i>	3
T E 280B <i>Renewable Energy Systems</i>	3
T E 320 <i>Contemporary Problems in Production*</i>	3
T E 355 <i>Technology and Environment</i>	3
T E 357 <i>Alternative Futures</i>	3
T E 390 A <i>Technology and Community Development</i>	3
T E 390B <i>Technology and Third World Development</i>	3
Total	9 6**

Research

ED P 320 <i>Introduction to Research***</i>	3
ED P 330 <i>Foundations of Educational Measurement*</i>	3
T E 397 <i>Master's Degree Research</i>	6
Total	12
Totals	31 6
Total Minimum Semester Hours	37

* A minimum of six semester hours of graduate work in the department must be completed prior to taking this course.

** Three semester hours of the electives can be taken outside of the technology education department.

*** Or approved substitutions.

Doctor of Education

A plan of study leading to the doctor of education is designed by the student in conjunction with an advisor and faculty committee. The course of study is based on stated philosophy and objectives. Once the plan of study is approved, it becomes a contract between the student and the graduate faculty. Each personal program must include at least two continuous semesters of full-time, in-residence study. A minimum of 72 semester hours beyond the bachelor's degree and a research dissertation are required.

The curriculum is oriented toward the development of professional competencies rather than specific course requirements. Generally, the competencies include the ability to interpret and to initiate scholarly research in the discipline of technology, a knowledge of significant technical developments in at least one area of concentration, an understanding of the historical development, cultural impact, and future implications of technology, the ability to develop effective instructional programs in the technologies, and the ability to integrate information from various sources in solving socio-technical problems.

Core Courses

TE 300 <i>Contemporary Problems in Transportation and</i>	3
TE 301 <i>Technical Developments in Transportation or</i>	3
TE 310 <i>Contemporary Problems in Communication and</i>	3
TE 311 <i>Technical Developments in Communication or</i>	3
TE 320 <i>Contemporary Problems in Production and</i>	3
TE 321 <i>Technical developments in Production and</i>	3
TE 384 <i>Interdisciplinary Seminar</i>	3
TE 400 <i>Technology: Its History and Development</i>	3
TE 404 <i>Readings in Technology and Culture</i>	3
TE 405 <i>Innovation and Invention</i>	3
TE 496 <i>Graduate Seminar</i>	1

Technology Education (T E)

245. *Women in International Development*. To examine the cultural diversities in the definition of women's roles and status, to investigate women's access to education, health, income, credit and technology, and to study women's contributions in third world development.

280. *Special Problems and Workshops*. I, II, S. 1-6 hr. To provide credits for special workshops and short intensive unit courses on special topics.

281. *Introduction to Technology*. 3 hr. An introduction to selected technical concepts and the evolution of the technical systems of transportation, communication, and production, with a focus on the relationship of these systems to technological change and the civilization process.

300. *Contemporary Problems in Transportation*. 3 hr. Technical and social/cultural problems related to efforts in the development and utilization of new and improved modes of transportation.

301. *Technical Developments in Transportation*. 3 hr. Selected developments in transportation technology. Principles, concepts, and processes fundamental to the design and development of transportation systems.

310. *Contemporary Problems in Communication*. 3 hr. Technical and social/cultural problems related to efforts in the development and utilization of new and improved modes of communication.

311. *Technical Developments in Communication*. 3 hr. Selected developments in communication technology; identification of principles, concepts, and processes fundamental to design and development of communication systems.

320. *Contemporary Problems in Production*. 3 hr. Technical and social/cultural problems resulting from efforts in the development and utilization of new and improved methods of producing goods and services.

321. *Technical Developments in Production*. 3 hr. Selected developments in production technology; identification of principles, concepts, and processes fundamental to the design and development of production systems.

330. *Contemporary Problems in Research and Development*. 3 hr. Research and investigation about transportation, communication, and production systems; technical and social/cultural problems related to research and development efforts.

344. *Technology and Society*. 3 hr. An analysis of the relationship of technical means, change, and society. Emphasis is on the influence of technical change on social institutions and culture in various societies.

351. *Contemporary Problems in Technology*. 3 hr. PR: T E 340 or 344 or consent. An analysis of current technical and social problems associated with the design, selection, and collective use of technical devices and systems.

355. *Technology and Environment*. 3 hr. PR: T E 340, 344, 351, or consent. A study of communication, production, and transportation systems, their impact on the environment and the analysis of resource management, machines and processes, energy use, health, and resource recovery related to these systems.
356. *Energy and Society*. 3 hr. PR: T E 340 or 344 or consent. An analysis of world energy resources and the problems associated with retrieval and conversion. Includes an analysis of the related social problems of citizen awareness, citizen responsibility, and public policy.
357. *Alternative Futures*. 3 hr. PR: T E 340 or 344 or consent. An overview of forecasting methods with group and individual activities using selected techniques to gain information about the future. Emphasis is on the design and redesign of technical systems for social purpose.
360. *Technical Concepts: How Things Work*. 3 hr. A study of the principles and components of technical devices. An analysis of mechanical, electrical, optical, acoustical, chemical, and pressure elements of technical systems.
371. *Curriculum Development and Physical Facility Design*. 3 hr. PR: T E 340 or 344 or consent. Development of curriculum components for the study of technology and the selection of facility design related to curricula requirements.
372. *Development of Instructional Materials*. 3 hr. PR: Consent. Design and development of media and instructional units for education in the technologies.
373. *Professional Development*. I, II, S. 1-6 hr. (May be repeated. Graded S or U. Not for degree credit.) PR: Consent. Specially designed experiences for those interested in advancing professional skills in the study of technology.
374. *Technology Education: Elementary School*. 3 hr. PR: T E 340, 344 or consent. An overview of technology, its role in society and its place in elementary curricula. Approaches to teaching technology as content and the integration of projects and activities into the elementary-school curriculum.
376. *Technology Education: Middle School*. 3 hr. PR: T E 340, 344, or consent. An overview of technology-related content appropriate for learners, age 10-14. Emphasis is on designing units and courses of study and the selection of instructional methods and materials.
378. *Technology Education: Secondary Schools*. 3 hr. PR: T E 340, 345, or consent. An overview of the content appropriate in technology courses for learners aged 14 and 18. Emphasis on designing units and courses of study and the selection of instructional methods and materials.
384. *Interdisciplinary Seminar—Technology and Culture*. 3 hr. PR: T E 340, 344, or consent. An analysis of the relationship between individuals, society, and technical systems. Guest presenters assist students in an examination of technology from the perspective of various disciplines.
385. *Practicum*. I, II, S. 1-12 hr. PR: Consent.
390. *Special Topics*. I, II, S. 1-6 hr. PR: Consent.

391. *Advanced Topics: Research Methods*. I, II, S. 1-6 hr.
397. *Master's Degree Research or Theory*. I, II, S. 1-15 hr.
400. *Technology: Its History and Development*. 3 hr. Major technical periods in the civilization process and the interrelationships of technological developments to the social/cultural milieu.
403. *Design in Technology*. S. 3 hr. Study of the design of technical products and systems.
404. *Readings in Technology and* . 3 hr. Fundamental, historical, and contemporary ideas of the nature of technology as an area of created knowledge.
405. *Innovation and Invention*. 3 hr. A study of the innovation and invention process.
480. *Projects in Technology*. I, II, S. 1-6 hr. PR: Consent.
481. *Problems in Technology*. I, II, S. 1-6 hr. PR: Consent.
490. *Teaching Practicum*. I, II, S. 2-4 hr. PR: Consent.
491. *Advanced Study: Research Methods*. PR: Consent.
492. *Directed Study*. I, II, S. 1-6 hr. PR: Consent.
493. *Special Topics*. I, II, S. 1-6 hr. PR: Consent.
494. *Special Seminars*. I, II, S. 1-6 hr. PR: Consent.
495. *Independent Study*. I, II, S. 1-6 hr. PR: Consent.
496. *Graduate Seminar*. I, II, S. 1-4 hr. PR: Consent.
497. *Research*. I, II, S. 1-15 hr. PR: Consent.
498. *Thesis*. I, II, S. 1-4 hr. PR: Consent.

Perley Isaac Reed School of Journalism

William T. Slater, Ph.D., Dean

R. Ivan Pinnell, Ph.D., Associate Dean

John H. Boyer, Ph.D., Director of Graduate Studies

The master of science in journalism (M.S.J.) is a program of the School of Journalism, located on the downtown campus in Martin Hall, WVU's oldest building (constructed in 1870). Martin Hall was renovated, refurnished and equipped in 1976-77.

Today, the school has modern broadcast news facilities and state-of-the-art electronic reporting and editing systems. The faculty, through their educational and professional backgrounds in mass communications studies and media-related experiences, are highly qualified to teach mass communications at both the undergraduate and graduate levels. About one-half hold doctoral degrees.

The master's program has granted more than 200 degrees since its first, in 1962. The School of Journalism, established in 1939 and one of the oldest in the United States, is one approximately 100 such programs accredited by the Accrediting Council on Education in Journalism and Mass Communications. The school has a total of more than 4,000 graduates, the majority of whom have careers in newspaper journalism, broadcasting, advertising, public relations or related fields.

Master's Program

The master's program offers students the choice of two tracks—the teaching-research track for persons who wish to go on for a doctoral degree and the professional track for those who wish to enhance their professional opportunities in some area of mass communications.

The program, designed to help each student reach full potential as a practitioner, teacher, or scholar in mass communications, prepares a graduate not only for a first job—those who obtain the master's degree should excel in the skills of the profession—but also for long-term productive career development through the study of mass communications and related fields.

The school is in the process of developing more specialized curricula for persons who aspire to become news or public relations specialists in such fields as business, energy and the environment, science, social relations, education, government, international affairs and sports.

Assistantships

Assistantships available in and through the school each year pay stipends and usually provide tuition remission. Graduate assistants teach laboratories and assist professors with courses. Some work in media-related positions in other programs at WVU.

Admission

For specific admission standards, curricula, or course descriptions, graduation requirements and other detailed information, please refer to the School of Journalism master's program section of this catalog.

Those interested in learning about and applying to the master's program should contact the dean, associate dean or graduate director: School of Journalism, 112 Martin Hall, Box 6010, West Virginia University, Morgantown, WV 26506-6010, Telephone: (304) 293-3505.

Graduate Faculty

[†] Indicates regular membership in the graduate faculty.

^{*} Indicates associate membership in the graduate faculty.

Professors

[†]John H. Boyer, Ph.D. (U. Mo.). Newspaper management, Media law, Women and the media.

[†]Robert M. Ours, Ph.D. (C. Wm. & Mary). Journalism history, Magazine and news and feature writing.

[†]William O. Seymour, M.A. (E. Tex. St. U.). Photojournalism.

Associate Professors

[†]Lynn Hinds, Ph.D. (U. Pitt.). Broadcast news, Research.

[†]R. Ivan Pinnell, Ph.D. (U. Denver). Public relations.

[†]Richard A. Schrieber, Ph.D. (U. Iowa). Creative advertising, Communication theory.

^{*}Pamela D. Yagle, M.S.J. (WVU). Reporting, Language skills, High school publications.

Assistant Professors

^{*}Ralph E. Hanson, Ph.D. (Ariz. St. U.). Reporting, Editing, News and feature writing.

^{*}Theodore Lustig, M.A. (NYU). Public relations

Christine M. Martin, M.A. (U. Maryland). News and feature writing, Journalism history.

Maryanne Reed, M.A. (Northwestern U.). Broadcast news.

Ron Schie, M.F.A. (Ohio U.). Advertising media, Copy, Campaigns.

Lecturer

Susan Bohna, B.S.J. (WVU). Broadcast news, Development.

Emeriti Professors

Paul A. Atkins, M.A. (U. Va.)

Charles F. Cremer, Ph.D. (U. Iowa).

Harry W. Elwood, M.S. (Northwestern U.).

Guy H. Stewart, Ph.D. (U. Illinois). Dean.

William R. Summers, Jr., M.A. (U. Mo.).

Adjunct Assistant Professors

Carolyn Bailey-Lewis, M.S.J. (WVU). Public relations.

Dennis R. Godfrey, M.A. (WVU). Broadcast news, Public affairs.

Jack M. Johns, M.S.J. (WVU). Broadcast news, Production.

The master of science in journalism (M.S.J.) program in the Perley Isaac Reed School of Journalism is designed to help persons involved in the various aspects of mass communication better understand and cope not only with the increased complexity of their own field, but also with fields outside mass communication.

The program, designed to help each student reach full potential as a worker, teacher, or scholar in mass communication, helps prepare a student not only for a first job—although students who obtain the M.S.J. degree should excel in the skills of the profession—but also for long-term and productive career development through the study of mass communication and related fields.

The M.S.J. program is intended to afford liberal arts graduates an opportunity to concentrate advanced study in mass communication; provide intensive study for persons who have undergraduate journalism training, but who wish to pool their journalistic skills with extensive knowledge in another substantive area or areas (e.g., political science, economics, science); and give persons who have had considerable professional experience an opportunity to broaden their academic bases through carefully selected advanced studies.

Admission

Admission to the M.S.J. program is limited to holders of baccalaureate or equivalent degrees from institutions of higher learning. Applicants should have combined verbal and quantitative scores on the Graduate Record Examination (GRE) Aptitude Test of at

least 1000 and overall grade-point averages (GPA) of at least 3.0 on a 4.0 scale. Each applicant also should submit to the director of graduate studies in the School of Journalism a detailed essay explaining why the student wants to undertake graduate study in journalism, what the student hopes to get from the graduate journalism program, what the long-term goals are, and how graduate education in journalism can help achieve those goals.

An applicant who doesn't meet the minimum GRE and/or GPA requirement(s) may be accepted only if the low GPA or GRE scores are offset by other factors. Excellent recommendations, unusual grading patterns (e.g., a steady rise of grades), an outstanding statement of purpose, or examples of professional accomplishment sometimes can offset low GRE scores or a low GPA.

Students applying for admission to the M.S.J. program are encouraged to send nonreturnable supporting material to the director of graduate studies in the School of Journalism. Examples of published or unpublished writing, research, or photography, a detailed listing of professional media experience or other relevant job experience, and other supporting materials will be considered by the admissions committee. All other materials (e.g., transcripts, GRE scores, application forms) should be sent to the Office of Admissions and Records.

Additional Requirements

A student who does not have a bachelor's degree in journalism or extensive professional experience must meet these additional requirements:

- Must have completed a core of journalism courses, with subjects and grades acceptable to the School of Journalism, or
- Must complete undergraduate journalism and other courses to be prescribed by the School of Journalism, or
- Must demonstrate knowledge and competence in a number of journalism topics to be prescribed by the School of Journalism, or
- Must meet a combination of the foregoing requirements.

Application

All applications for admission are considered by the committee on graduate studies. The director of graduate studies advises all students about general problems and concerns, courses to take, projects to undertake, special training to obtain, and appropriate outside areas for study.

Plan of Study

Early in the student's program, usually by the completion of six-to-nine credit hours of graduate course work, the student and the advisor draw up a plan of study to show the direction of the student's course work. The plan may also indicate a general time frame anticipated for the completion of this work and may contain the direction and outline of the research problem to be undertaken. This plan of study becomes a part of the student's record, and constitutes, with some degree of specificity, the terms and conditions that the student must meet for completing the degree requirements. Subsequent changes in the plan of study must be approved by the student and the advisor, and no graduate student may take a course S/U or Pass-Fail without written permission of the graduate director.

Assistantships

Approximately five assistantships and/or internships are available in and through the School of Journalism each semester. Graduate assistants teach laboratories and assist professors with their courses. Interns work in mass communication-related jobs on campus to obtain solid professional experience.

Tuition Waivers

Students receive stipends for the academic semester and may apply for tuition remission for the entire year. Although sometimes renewed for a second or third semester, assistantships and internships are granted for one academic semester. Graduate assistants and interns work an average of 20 hours per week during the academic year.

Persons who want to be considered for assistantships or internships should have their applications on file with the director of graduate studies in the School of Journalism before March 1.

Emphases

The School of Journalism offers two areas of emphasis—the teaching-research track and the professional track—within the M.S.J. program.

Teaching/Research - The teaching-research track is generally a program for persons who want to go on for a Ph.D. degree, teach in a community college, or conduct research in some areas of mass communication. Persons in the track normally take research and theory courses both inside and outside the School of Journalism, statistics, and social science courses. The program culminates in a thesis, which is a scholarly study of an important aspect of mass communication.

Professional - The professional track is designed primarily for persons who wish to become excellent practitioners in some field of mass communication and who have little desire to teach or become mass communication researchers. Persons in the professional track normally take communication and outside area courses that will help them become better practitioners. The program culminates in a professional project, which helps a student extend his or her knowledge about a given aspect of mass communication but which should be the sort of nonroutine project on which the student might work as a professional.

Time Limitation

Students must complete all requirements for their degrees, including either a thesis or professional project within four years of the start of the first course work in their programs.

Requirements

For the master's degree in journalism, the student must meet the following requirements:

Teaching/Research - A minimum of 30 semester hours of acceptable graduate credit, including a thesis for six hours of credit.

- As part of the 30 hours, a minimum of 18 hours, including the thesis, in School of Journalism courses.

- Included in the 30 hours, a minimum of nine hours in a minor conducted outside the School of Journalism.

Professional - A minimum of 30 semester hours of acceptable graduate credit, including a professional project for six hours of credit.

- As part of the 30 hours, a minimum of 18 hours, including the professional project, in School of Journalism courses.

- Included in the 30 hours, a minimum of nine hours in a minor conducted outside the School of Journalism.

In either program, the candidate is allowed to take more than the minimum required number of hours.

All Students - The following courses are required for all journalism graduate students:

JRL 300 *Introduction to Graduate Studies* (no credit);

JRL 304 *Mass Media and Society* (3 hr.);

JRL 320 *Advanced Journalistic Writing and Research* (3 hr.); and

JRL 401 *Research Methods* (3 hr.).

In both programs, 60 percent of the graduate credits submitted for the degree must be in courses numbered 300 or above.

Course work must be completed with a minimum grade-point average of 3.0. The thesis and professional project are graded as S or U (Satisfactory or Unsatisfactory).

Except for thesis, professional project, and internship courses, no student will be permitted to take a course on a Pass-Fail or Satisfactory-Unsatisfactory grade basis without prior approval of the Director of Graduate Studies.

Examination

The candidate for the master's degree will pass an oral examination on the thesis or professional project. In addition, the thesis or professional project will be evaluated as a test of the candidate's writing skill.

The kinds of courses taken in the M.S.J. program largely depend on each student's background and interests. The program is intended to accommodate students of differing academic and professional backgrounds and interests.

A student typically will take all outside courses in one area (e.g., biology, political science, history), although the student may decide after consultation with the advisor to take courses in two or more outside areas. Courses outside the School of Journalism are selected by students in consultation with their advisors; outside courses selected are subject to the availability of space and prerequisite requirements in the offering departments.

Thesis/Professional Project

Each student must complete a thesis or professional project involving original work in the student's area of interest. The student should have a thesis or professional project proposal written by the end of the semester in which the first 12 hours of course work are completed.

Each student is responsible for developing ideas for the thesis or project. Through consultations with members of the journalism faculty, the student determines faculty interests and areas of expertise, and ideas are refined to the point where the student has a significant and feasible idea in mind.

Advisory Committee

The student, with approval of the Graduate Studies Committee, selects the journalism faculty member who would be best able to chair the advisory committee, subject to the agreement of the faculty member. If questions arise about a faculty member's interest or knowledge, the student directly asks the faculty member or consults the academic advisor or other members of the Graduate Studies Committee. With the chairperson, the student further refines the idea to a "preliminary proposal" stage, in which ideas and appropriate methodology are on paper, but not necessarily in formal proposal form.

After the student has written a preliminary proposal and selected a faculty chairperson, the student should select other members of the advisory committee, subject to their willingness to serve. The advisory committee must consist of not fewer than four members, one from outside the School of Journalism; two persons must be members of the WVU graduate faculty.

Proposal

At this point, students in the professional track must submit their proposals to the Graduate Studies Committee, which must approve all professional project topics (but not research methods, specific research questions, or hypotheses, etc.). Students may attend the meetings at which their proposals are discussed. After securing Graduate Studies Committee approval, students in the professional track schedule hearings with their guidance committees. Hearings with the guidance committees are required of all students (including those in the teaching research track).

Working under the guidance of the advisory committee, the student prepares a complete thesis or project proposal, extended from the preliminary proposal. Guidance for preparing a proposal is available from the director of graduate studies.

The student then has a consultative meeting, during which final revisions of and refinements in the proposal are discussed with the members of the advisory committee. Notices of the public meeting (to which students are invited) must be placed in the boxes of all members of the School of Journalism faculty and posted outside the dean's office at least two weeks before the meeting. One copy of the thesis or project proposal must be placed on reserve in the journalism reading room.

Thesis Approval

After the consultation, the committee votes to accept or reject the proposal. The student whose proposal is approved works closely with the committee in the completion of the thesis or project. All committee members should be kept informed and consulted for advice (as needed and as desired by them) as the thesis or project develops.

After each member of the advisory committee is satisfied with the work, a public oral examination is scheduled. Two weeks' notice must be given to all faculty of the School of Journalism (notices should be placed in all faculty boxes and posted outside the dean's office). One copy of the final thesis or project must be placed on reserve in the journalism reading room. Students also should make certain their shuttle sheets are filed with the Director of Graduate Studies in Journalism two weeks before the date of the oral defense.

Only committee members may vote on acceptance or rejection of a thesis. A majority vote is sufficient to approve the thesis, although a dissenting vote may be recorded. Furthermore, at least three signatures (two of which must be signatures of graduate faculty members) must be on the approval sheet. If one committee member is outvoted and feels he/she cannot sign the approval sheet, he/she may resign from the committee. Such action may force a reconstitution of the committee and repetition of earlier mentioned steps leading to the oral examination.

The chairperson of the advisory committee will decide whether final corrections (after the oral examination) have been made properly, and he/she will check the style and form of the final typed version. The MLA Stylesheet or other approved stylebook should be carefully followed during preparation of a thesis or professional project. Four copies of the final thesis or two copies of a project should be delivered to the School of Journalism.

Maintenance of Scholarship

All students are expected to maintain satisfactory progress toward the degree. A student's graduate record begins with the first course credited to the degree and includes all subsequent courses. All students must maintain a grade-point average of at least 3.0 and complete all requirements within four years. Students who fail to meet this standard will be dropped from the program.

Each student working toward the M.S.J. degree must register for at least one semester hour each regular (fall and spring) semester. This enrollment may be in course work or in Journalism 497 *Research*.

International Students

Believing that mutual benefit is derived when students from other countries study in the WVU School of Journalism, the School welcomes foreign students. At the same time, the School recognizes that journalism, more than many other fields, requires language skill. To profit by journalism study, foreign students must have a ready understanding of English. They will be called on to follow rapid speech in interviews, press conferences, public addresses, and in the classroom, as well as to deal with abstract ideas communicated in English. Award of the master's degree in journalism attests to the student's facility in English. Foreign students must maintain the same 3.0 grade-point average required of other students.

Recognizing the language difficulty, the School of Journalism offers foreign students a transition semester. Unless students obviously are fluent in English and pass a test in which they demonstrate comprehensive knowledge of English fundamentals (grammar, punctuation, syntax, spelling), they will be offered a semester of undergraduate study (not for graduate credit), which will enable them to sharpen language skills. Such a transitional semester also will permit foreign students to study other selected courses in preparation for graduate study. These courses will help them adapt to the American system of journalism and to the new cultural environment.

Advertising (ADV)

201. *Retail Advertising*. I, II. 3 hr. PR: Admission to the school, ADV 115, ADV 203. Strategic advertising planning for retail merchants. Writing ads to meet objectives. Sales management and sales of local advertising time and space. Exercises in newspaper, radio, TV, direct marketing, outdoor advertising, specialty advertising, etc. 3 hr. lec.

203. *Advertising Media Analysis*. I, II. 3 hr. PR: ADV 113 and admission to the School. Survey of local and national media; identification of appropriate audiences and use of media resources; media space and time buying based on advertisers' strategic plans; introduction to computer-aided planning.

210. *Graphic Design*. 3 hr. PR: ADV 110 or consent. Design layouts for print media. Includes buying, supervising, and scheduling of art, typography, and print material. 2 hr. lec., 2 hr. lab.

239. *Seminar in Advertising Management Problems*. 2 hr. PR: Senior standing and major or minor in advertising. Application of the study of advertising research, law, and theory in the preparation of a national advertising campaign. Aspects of the campaign to cover marketing, research, creative, media, sales promotion, and presentation.

251. *Direct Marketing*. II. 3 hr. PR: ADV 115, 203, or consent. Mailing, marketing, and creation of direct-mail letters, brochures, involvement pieces, and reply cards; postal regulations, direct-mail law, and printing procedures.

259. *Campaigns*. 3 hr. PR: ADV 115, 203, JRL 221, and senior standing or consent. Complete advertising campaigns for simulated local stores and major national businesses; evaluations based on professionalism of all facets of campaigns.

Broadcast News (BN)

285. *Broadcast Journalism 2*. I, II. 3 hr. PR: BN 186. Continuation of BN 185, 186. Television news, including electronic news gathering (ENG) and production of newscasts. (Lab fee \$30.00.)

287. *Broadcast Journalism 2*. I, II. 3 hr. PR: BN 185, 186. Continuation of JRL 185. Television news, including electronic news gathering (ENG).

Journalism (JRL)

221. *Mass Communications Research Methods*. I, II. 3 hr. PR: Admission to the School. A broad study of scientific and critical research methods as they apply to mass media practices; review of relevant sources for historical data gathering, readership and audience analysis; evaluation of marketing and public opinion research. (2 hr. lec., 1 hr. field experience.)

231. *Multi-Media Production*. 3 hr. PR: JRL 120 or consent. Preparation of two multimedia presentations; participation in a client-oriented project; color theory, slides, scriptwriting, research, and other aspects of visual communications. Supplies cost about \$75.00.

241. *Internship*. S. 3 hr. Journalism majors only and foundation courses in one of the sequences. Full-time employment for a minimum of ten weeks under a signed contract detailing the terms of the experience. Graded pass/fail.

242. *Practicum*. I, II. 1-2 hr. Journalism majors only. PR: Foundation courses in one of the sequences. Student must have a signed contract detailing terms of the learning experience. 8-20 hours per week for minimum of 10 weeks, while taking other courses. Graded on Pass/Fail basis. (1-2 hr. work experience.)

300. *Introduction to Graduate Studies*. I. (No credit.) (Required of all graduate journalism students.) Designed to orient students to graduate study. (Class meets once a week.)

304. *Mass Media and Society*. II. 3 hr. (Required of all graduate journalism students.) Study of mass media and their role in and influence on society; includes analysis of the social, political, and economic determinants of media content and character.

320. *Advanced Journalistic Writing and Research*. I, S. 3 hr. (Required of all graduate journalism students.) Study of advanced journalistic writing and research techniques. Students will practice the writing and research techniques on topics of their own choosing. Academic or popular topics may be selected.

340. *Corporate Communications*. I. 3 hr. Conferences to examine the synergistic effects of advertising, journalism, and public relations for different kinds of corporations. Team projects and presentations.

341. *Special Topics*. I, II, S. 1-6 hr. Student proposes idea for substantial reading, research, writing in area of interest; requirements may include conventional term paper, series of articles, slide presentation, oral presentations, etc. Student works independently of classroom setting.

380. *Thesis*. I, II, S. 2-6 hr. PR: Approved thesis proposal.

389. *Ethics of Mass Communications*. I. 2 . PR: Open to graduate journalism students and journalism seniors with a 3.0 grade-point average; consent. Introduction to ethical principles and their application in the development of mass media systems and societal changes; professional codes; case studies; current problems.

390. *Professional Project*. I, II, S. 2-6 hr. PR: Approved professional project proposal. Non-thesis professional project for students preparing for some field in mass communication.

401. *Research Methods*. I. 3 hr. (Required of all graduate journalism students.) Study of quantitative methods common to research in communications. An introduction to sampling, measurement, analytic procedures, and data.

402. *Seminar in Research Problems*. II. 3 hr. Advanced study of methodological techniques. Research project chosen from area of student's major interest. A written report of the study undertaken is required.

497. *Research*. I, II, S. 1-15 hr. For graduate students not seeking course work credit but who wish to meet residence requirements, use the University's facilities, and participate in its academic and cultural programs.

News-Editorial (N-E)

220. *Writing for Magazines*. I, II. 3 hr. PR: JRL 18 or consent. Professional approach: magazine analysis, query letters, writing, rewriting; submitting manuscripts for publication.

225. *High School Publications Advising*. II. 3 hr. PR: JRL 19, ADV 113, or consent. (For students seeking Journalism certification.) Emphasizes writing styles, newspaper/yearbook layout, rights and responsibilities of the teacher, students, and school system. Enrollees will construct instructional portfolios based on research and classroom discussion concepts. (Offered alternate years.)

227. *History of Journalism*. I. 3 hr. PR: JRL 1, HIST 52 and 53, or consent. Development of media from seventeenth-century England and in the American colonies; great names in journalism; freedom of press and its implications for and impact on the nation.

228. *Law of the News Media*. II. 3 hr. (For journalism seniors and graduate students.) PR: JRL 18 or foundation courses for other sequences. The law as it affects the mass media. Considered are such areas as libel, privacy, public records, criminal pretrial publicity, freedom of information, obscenity.

230. *Editorial and Critical Writing*. I. 3 hr. PR: JRL 19 or consent. The student will analyze and write commentaries; study typical editorial pages and the ethics governing editorial page content; become familiar with libel, privacy, contempt, and other problems—operating and political—as they arise.

Public Relations (PR)

222. *Public Relations Case Studies*. II. 3 hr. PR: PR 124 and JRL 221 or consent. Seminar based on in-depth studies of public relations programs developed and applied in support of our institutions. Primary emphasis on successful campaigns, but unsuccessful efforts also will be examined for causes of failures.

312. *Public Relations Fund Raising and Foundation Management*. I. 3-6 hr. (Open to graduate journalism students and to seniors with a 3.0 grade-point average; consent.) Seminar. Studies in public relations fund raising, alumni relations, and foundation management.

School of Medicine

Robert M. D'Alessandri, M.D., Dean and Vice President for Health Sciences

George A. Hedge, Ph.D., Associate Dean, Research and Graduate Studies

John W. Traubert, M.D., Associate Dean, Student and Curricular Affairs

James Shumway, Ph.D., Assistant Dean, Educational Programs

The West Virginia University School of Medicine shares excellent facilities in the Health Sciences Center with the other health-related professional schools of the University. The Ruby Memorial Hospital offers sophisticated medical technology, including magnetic resonance imagery, lithotripsy, laser surgery, and the necessary support technology. The Chestnut Ridge Psychiatric Hospital, the Mary Babb Randolph Regional Cancer Center, the Positron Emission Tomography, and the Mountainview Rehabilitation Hospital provide facilities totally dedicated to diagnosis, treatment and research in their fields of specialization. Laboratories and teaching areas allow scientists to work toward their goals. Research areas of anatomy, biochemistry, cellular biology, medical technology, microbiology and immunology, pathology, pharmacology and toxicology, and physiology support study toward masters of science and doctors of philosophy degrees.

A combined M.D.-Ph.D. program is available to those students who show exceptional interest and scholarly promise. All of the admission requirements of the School of Medicine and the specific graduate program apply. Students should apply for the combined degree program after acceptance to the School of Medicine.

All basic science graduate programs require the submission of scores from the Graduate Record Examination and some may require scores from the applicable advanced test, but in no program are test scores the sole criterion for admission. Prospective graduate students are urged to initiate application for admission as early as possible. The first step is an inquiry to the department offering the program desired; the reply to such an inquiry will include instructions for applying to the particular program.

Initial application must be made for admission to graduate study on standard forms provided by the WVU Office of Admissions and Records. To transfer from one University school or department to another, students may initiate a transfer request by contacting the Health Sciences Center Graduate Programs Office or their advisors. The advisor must contact the Health Sciences Center Graduate Programs Office to complete transfer.

The West Virginia University School of Medicine is accredited by the Liaison Committee on Medical Education of the American Medical Association and the Association of American Medical Colleges.

Graduate Programs

Anatomy	M.S., Ph.D.
Biochemistry (Medical)	M.S., Ph.D.
Community Health Promotion	M.S.
Exercise Physiology	M.S.
Medical Technology	M.S.
Microbiology and Immunology (Medical)	M.S., Ph.D.
Pharmacology and Toxicology	M.S., Ph.D.
Physiology (Medical)	M.S., Ph.D.
Public Health	M.P.H.

Graduate Faculty

† Indicates regular membership in the graduate faculty.

* Indicates associate membership in the graduate faculty.

Anatomy

Professors

*William A. Beresford, D. Phil. (U. Oxford). Cell differentiation.

†J. David Blaha, M.D. (U. Mich.). Orthopedics and tissue reactions to implants.

†Eugene V. Cilento, Ph.D. (U. Cincinnati). Research. Quantitative *in vivo* microscopic studies of hepatic microcirculatory transport phenomena.

†James L. Culberson, Ph.D. (Tulane U.). Comparative vertebrate neuroanatomy of mammalian somatosensory systems.

†Richard D. Dey, Ph.D. (Mich. St. U.). Distribution and function of neural mediators in the airways and their role in asthma, bronchitis, and occupationally related lung diseases.

†Gary Kirk, Ph.D. (Yale U.). X-ray microanalysis of blood cell development and drug metabolism.

†Gregory W. Konat, Ph.D. (U. Odense). Molecular biology of myelinogenesis in the central nervous system.

R. John C. Pearson, M.B. (Cambridge U., England), M.P.H. (Yale) Adjunct. Community Medicine. Occupational Medicine.

†Carlin A. Pinkstaff, Ph.D. (Emory U.). Histochemistry, especially comparative histology and histochemistry of salivary glands

†Frank D. Reilly, Ph.D. (U. Conn.). Neurohistochemical, biochemical, *in vivo*, and electron microscopic studies of mechanisms regulating hepatic or splenic blood flow and metabolism in conditions of health and disease.

†Randall W. Reyer, Ph.D. (Yale U.). Regeneration, developmental biology. *Emeritus*.

†Richard Wiggins, Ph.D. (Duke U.). Chair person. Cell and molecular biology of demyelinating and developmental disorders of the brain, including the effects of cocaine and malnutrition.

Associate Professors

*Morton H. Friedman, Ph.D. (U. Tenn.). Preprofessional advising, Educational administration, Student affairs.

†Rumy A. Hilloowala, Ph.D. (U. Ala.). History of medicine, Physical anthropology, Primatology (craniofacial structure).

*Dennis O. Overman, Ph.D. (U. Mich.). Experimental teratology, especially abnormal craniofacial development, Organ culture.

*Robert S. Pope, Ph.D. (U. ND). Electron microscopic structural and cytochemical aspects of intra- and intercellular development of mammalian female gamete under *in vivo* and *in vitro* conditions

†Elizabeth R. Walker, Ph.D. (WVU). Electron microscopy and immunocytochemistry of extracellular matrix components in connective tissue disease.

Assistant Professor

Ariel Agmon, Ph.D. (Stanford). Electrophysiology and morphology of developing cortex.

†Albert S. Berrebi, Ph.D. (U. Conn., Storrs). Neurobiology of hearing.

†Adrienne Salm, Ph.D. (Mich. St. U.) Cell biology of astrocytes.

Biochemistry

Professors

†Diana S. Beattie, Ph.D. (U. Pitt.). Chairperson. Mitochondrial biogenesis, Mitochondrial metabolism, Heme biosynthesis, Interrelationship of heme and protein synthesis.

*Fred R. Butcher, Ph.D. (Ohio St. U.). Hormone action, Regulation of exocytosis, Calcium.

†William J. Canady, Ph.D. (Geo. Wash. U.). Enzyme kinetics. *Emeritus*

†John P. Durham, Ph.D. (Ohio St. U.). Control of cell proliferation.

†Charles L. Harris, Ph.D. (U. Ill.). Structure and function of transfer RNA, RNA synthesis in mammalian cells.

†Michael R. Miller, Ph.D. (Penn. St. U.). Regulation of DNA metabolism, DNA replication, Repair in mammalian and fish cells.

†Gale W. Rafter, Ph.D. (U. Wash.). Chemistry of host-parasite relationship. *Emeritus*

†George P. Tryfiates, Ph.D. (Rutgers U.). Nutritional oncology.

†Mary J. Wimmer, Ph.D. (U. N.C.). Mechanisms and regulation of enzyme-catalyzed reactions.

Associate Professor

*Marilyn I. Evans, Ph.D. (U. Wash.). Hormonal regulation of genes.

Assistant Professors

*Brad Hillgartner, Ph.D. (Mich. St. U.). Nutritional control of gene expression, Thyroid hormone action.

*Vinay K. Pathak, Ph.D. (U.C.-Davis). Retroviral genetics, Isolation of antioncogenes.

*Lisa M. Salati, Ph.D. (U. Minn.). Regulation of gene expression by fatty acids.

Andrew K. Shiemke, Ph.D. (Oregon Grad. Inst.) Biological oxidation of methane and cyanide;
Metalloproteins and bioinorganic chemistry.

Community Health Promotion

Professors

*Kenard McPherson, Ed.D. (Mich. St. U.). Program Director. Injury Control, Safety and mobility, Wellness.

*Peter Shaffron, Ed.D. (WVU). Safety and health education, Driver and traffic safety education, Older driver performance.

Associate Professor

*John M. Cavendish, Ed.D. (WVU). Community health, Wellness, Substance abuse.

Assistant Professor

*Karen K. Douglas, Ph.D. (Texas Wom. U.). Health, Education, Wellness, Curriculum development, fitness, AIDS education.

William E. Peger, Ed.D. (WVU). Wellness, Holistic healing, Stress management, Health behavior.

Exercise Physiology

Professors

*Daniel Banks, M.D. (Wayne St. U.). Pulmonary and critical care medicine

*Robert Hoeldtke, M.D., Ph.D. (Cornell, MIT). Autonomic neuropathy, Diabetes.

*Irma Ullrich, M.D. (U. Minn.). Diabetes and exercise, Obesity, Osteoporosis.

*Rachel Yeater, Ph.D. (WVU). Program director. Heart disease prevention, Cardiac rehabilitation.

Associate Professors

*L. Phillips Maxwell, M.D. (WVU). Cardiology, Hypertension, Angioplasty.

Assistant Professors

*Randall Bryner, M.D. (WVU). Reproductive physiology, Exercise and immune function.

*W. Guyton Hornsby, Jr., Ph.D. (LSU). Diabetes and exercise, Strength and conditioning.

Medical Technology

Professors

*Jean D. Holter, Ed.D. (WVU). Program Director. Medical technology, Chemistry, Instrumentation.

*Nathaniel F. Rodman, M.D. (U. Penn). Pathology, Coagulation.

†Donald A. Sens, Ph.D. (U. S. C.). Pathology.

†Mary Ann Sens, M.D., Ph.D. (Med. U. of S.C.). Pathology.

*John G. Thomas, Ph.D. (Syracuse U.). Pathology, Virology, Microbiology.

Associate Professors

*Singanallur N. Jagannathan, Ph.D. (U. Bombay). Pathology, Biochemistry.

*Roger S. Riley, M.D., Ph.D. (WVU). Pathology, Hematology.

*Harry L. Taylor, Jr., M.D. (Med. Coll. of Ga.). Pathology, Blood Banking.

Assistant Professor

*Steven M. Faynor, Ph.D. (U. Wisc.). Pathology, Toxicology, Clinical Chemistry.

Microbiology

Professors

*Stephen C. Aronoff, M.D. (U. Pitt.). Microbiology of cystic fibrosis, Infectious disease, Microbial resistance to antibiotics.

*John B. Barnett, Ph.D. (U. Louisville). Chairperson, Immunology, Mechanism of the effects of xenobiotics on the immune system.

*Robert Burrell, Ph.D. (Ohio St. U.). Immunology, Mechanisms of immune injury in pulmonary diseases.

- *Nyles Charon, Ph.D. (U. Minn.). Medical bacteriology, Genetics and physiology of spirochetes.
- *John Hall, Ph.D. (Purdue U.). Parasitology, Bacterial endosymbionts of free-living amebae.
- *Kenneth Landreth, Ph.D. (U. Wash.). Immunology, Developmental immunobiology, Lymphopoiesis.
- *Daniel M. Lewis, Ph.D. (WVU). Adjunct. Immunology, Mechanism of immunological reactions in the lung.
- *Stephen A. Olenchock, Ph.D. (WVU). Adjunct. Immunology, Study of immunological reactions in occupational lung disease.
- *Robert S. Pore, Ph.D. (U. Calif.). Mycology, Pathobiology of *Prototheca sp.* and the mycoses, Biotechnology projects include microbial bioconcentration and biopolymer production.
- *Irvin S. Snyder, Ph.D. (U. Kans.). Medical bacteriology, Mechanisms of pathogenicity, Clinical microbiology.
- *William Sorenson, Ph.D. (U. Texas). Adjunct. Role of fungi in occupational lung disease.
- *David B. Yelton, Ph.D. (U. Mass.). Microbial genetics, Molecular genetics, Bacteriophage.

Associate Professors

- Thomas Elliott, Ph.D. (UCSD). Bacterial gene expression.
- *James M. Sheil, Ph.D. (U. Ky.). Immunology, Mechanism of cytotoxic T lymphocyte-mediated antigen recognition and effector function.
- *Herbert A. Thompson, Ph.D. (U. Kans.). Medical bacteriology, Mechanisms of pathogenicity, Clinical microbiology.
- David Weissman, M.D. (Nwstrn U.). Immunology, Pulmonary immune responses, Effect of airway disease and smoking on immune function of the lung.

Assistant Professors

- *Christopher Cuff, Ph.D. (Temple). Mucosal immunity of the gastrointestinal tract.
- Douglas Drevets, M.D. (U. Kan.). Inflammation, Endothelial cell biology, Macrophage adhesion and function in infection.
- Meenal Elliott, Ph.D. (U. Alabama Birmingham). Regulation of lymphocyte development.
- Solveig G. Ericson, M.D., Ph.D. (Boston U.). Hemopoiesis, Phenotypic and functional maturation of myeloid cells, Bone marrow transplantation.
- *Daniel Flynn, Ph.D. (NC State). Tyrosine phosphorylation and signal transduction.
- Laura F. Gibson, Ph.D. (WVU). Cell and molecular biology, Developmental hematopoiesis, Bone marrow microenvironment, Stromal cell function in bone marrow.
- Rosana Schafer, Ph.D. (Temple). Immunology. Immune response to infection by intracellular pathogens.
- Wei-Shau Hu, Ph.D. (U. C. -Davis). Retrovirus recombination and replication, Mechanisms of oncogene transduction, Human gene therapy.
- William McCleary, Ph.D. (U.C. -Berkely). Mechanisms of signal transduction. Molecular genetics.

Pharmacology and Toxicology

Professors

- *Brenda K. Colasanti, Ph.D. (WVU). Effects of psychoactive drugs on brain neurochemistry and electrophysiology during sleep-wakefulness cycle.
- *Charles R. Craig, Ph.D. (U. Wisc.). Mechanism of action of anticonvulsant drugs, Experimental epilepsy, Neuropharmacology.
- *Mary E. Davis, Ph.D. (Mich. St. U.). Mechanisms of hepatic and renal toxicity.
- *Jeffrey S. Fedan, Ph.D. (U. Ala.). Adjunct. Photo affinity labeling of receptors, Mechanisms of airway hyperactivity.
- *William W. Fleming, Ph.D. (Princeton U.). Chairperson. Factors regulating the sensitivity of cells to drugs, Electrophysiology of cell membranes, Signal transduction.
- *Michael G. Mawhinney, Ph.D. (WVU). Connective-tissue metabolism in male sex accessory tissues, Endocrine pharmacology of prostatic cancer.
- *Mark J. Reasor, Ph.D. (J. Hopkins U.). Pulmonary toxicology of dusts, Drug-induced lipidosis, In vitro toxicology.
- *David J. Smith, Ph.D. (WVU). Alterations induced by analgesics and anesthetics in monaminergic and opiate neuronal transmission, Pain reactions.
- *Robert E. Stitzel, Ph.D. (U. Minn.). Co-Chairperson. Mechanism of action of antihypertensive agents, Biochemical factors influencing vascular reactivity.
- *Jeannine S. Strobl, Ph.D. (Geo. Wash. U.). Treatment of breast cancer, Molecular pharmacology of growth hormone.

- *David A. Taylor, Ph.D. (WVU). Factors underlying cellular adaptation and its involvement in pathological conditions, Electrophysiology and signal transduction.
- *Knox Van Dyke, Ph.D. (St. Louis U.). Chemiluminescence in human cells, Effects of antiinflammatory drugs on chemiluminescence.
- *Kenneth Weber, Ph.D. (U. Minn.). Adjunct. Respiratory mechanics, Mechanisms of occupational respiratory disease.

Associate Professors

- *Dale L. Birkle, Ph.D. (Va. Commonwealth U.). Membrane lipids and lipid-derived autacoids as regulators of neurotransmissions.

Assistant Professors

- Stephen G. Graber, Ph.D. (U. Vt.). Molecular mechanics of signal transduction, Specificity of G-protein action.
- *Philip J. Monroe, Ph.D. (WVU). Neurochemistry of monoaminergic and opioid neurons.
- *William F. Wonderlin, Ph.D. (Johns Hopkins U.). Ion channel pharmacology, Physiological development of ion channels.

Research Assistant Professors

- Kons Jian-Qiang, M.D., Ph.D. (Sun Yat-sen U. of Med. Sciences). Electrophysiology of cell membranes, Signal transduction.
- Elizabeth Anne Johnson, Ph.D. (U. Cal., S.F.). Tumor tissue biology, Cell cycle regulating proteins, Tumor tissue markers.

Physiology Professors

- *Christine Baylis, Ph.D. (Leeds U.). Renal and systemic hemodynamics.
- *Paul B. Brown, Ph.D. (U. Chicago). Neurophysiology, Neuroanatomy.
- *Vincent Castranova, Ph.D. (WVU). Regulation of membrane transport.
- *Stanley Einzig, M.D. (UCLA), Ph.D. (U. of Minn.). Cardiovascular physiology.
- *Robert L. Goodman, Ph.D. (U. Pitt.). Neuroendocrine control of ovarian function.
- *George A. Hedge, Ph.D. (Stanford U.). Thyroid and adrenocortical neuroendocrinology.
- *Michael D. Johnson, Ph.D. (U. Mich.). Neural and hormonal control of renal function and blood pressure.
- *David Kreulen, Ph.D. (Wayne State U.). Chairperson, Neurotransmitter actions and function, Neuropharmacology of ion channels in neurons.
- *Ping Lee, Ph.D. (Duke U.). Membrane transport.
- *Philip R. Miles, Ph.D. (WVU). Cellular physiology of the lung.
- *David Z. Morgan, M.D. (Med. Coll. of Va.), Director, Geriatric Program. Advice for retired patients.
- *William T. Stauber, Ph.D. (Rutgers U.). Muscle adaptation/injury, Proteases, Lysosomes.

Associate Professors

- *Matthew Boegehold, Ph.D. (U. Az.) Regulation of the microcirculation; Microvascular alterations in hypertension.
- *John M. Connors, Ph.D. (U. Ill.). Research. Feedback control of hypothalamic-pituitary-thyroid axis.
- *Gunter N. Franz, Ph.D. (U. Wash.). Voltage clamping of cell membranes and lung mechanics.
- *David G. Frazer, Ph.D. (Penn. St. U.). Examination of mechanical properties of excised lungs.
- *Wil E. Gladfelter, Ph.D. (U. Penn.). Hypothalamic control of the excitability of the motor system.
- *Ronald Millecchia, Ph.D. (Rockefeller U.). Neurophysiology.
- *Stanley Yokota, Ph.D. (U. Calif.-Riverside). Renal physiology, Microcirculation, Osmoregulation.

Assistant Professors

- *Linda J. Huffman, Ph.D. (U. Nebr.). Research. Neuroendocrinology, Thyroid axis.
- *George A. Spirou, Ph.D. (U. of Fla.). Neurophysiology. Neuroanatomy of audition.

Research Associate Professor

- *Mieczyslaw Michalkiewicz, D.V.M. (U. Warsaw). Research. Thyroid and pituitary neuroendocrinology.

Research Assistant Professor

- *Alberto Travagli, Ph.D. (Ferrara U. Georgetown). Electrophysiology of autonomic nervous system.

Public Health Professors

- Bill Carlton, Ed.D, M.S. (U. Tenn.-Knoxville). Program Director

Alan Ducatman, M.D., M.S. (Wayne St. U.). Director, Institute of Occupational and Environmental Health.

David Hall, Ph.D. (U. Ky.). Medical sociology.

John Pearson, M.B. (Cambridge U.), M.P.H. (Yale U.). Chair, Community medicine.

Assistant Professors

Beth Barnett, Ph.D. (UNC). Prevention Research Center, Public health.

Syed Islam, M.B.B.S. (Medical College of Bangladesh), Dr.P.H. (U. Mich.), M.P.H. (U. Alabama-Birmingham). Institute of Occupational and Environmental Health, Epidemiologist.

Debra Krummel, Ph.D. (Penn. St. U.). Prevention Research Center, Public health nutrition.

Sandra Magnetti, Dr.P.H., M.S. (U. Texas Health Science Center-Houston). Institute for Occupational and Environmental Health, Epidemiologist.

Associate Professors

Kenneth Simon, Ed.D. (Columbia U.). Director, Prevention Research Center.

Gerry Hobbs, Ph.D. (Kansas St. U.). Statistics and computer science.

William D. Wyant, M.S.E., M.P.A. (WVU). Engineering scientist, Associate Chair.

Anatomy

Richard C. Wiggins, Chairperson of the Department

Richard Dey, Graduate Program Coordinator

4052 Health Sciences North

Degrees Offered: Master of Science, Doctor of Philosophy

The Department of Anatomy in the School of Medicine offers graduate programs which are committed to the training of competent researchers and capable teachers. This is accomplished by the completion of a carefully designed plan of study tailored to the individual student's interests. The program emphasizes the cultivation of interest and expertise in experimental biomedical science, founded upon instruction in functional, cellular, molecular, developmental, and morphological aspects of human anatomy. The student conducts an original research project which culminates in a dissertation (doctor of philosophy) or a thesis (master of science).

Admission

In addition to the admission procedure of the University, the Department of Anatomy requires that each applicant complete a departmental application form obtained from the department. After an application is favorably reviewed, applicants are invited for a personal interview whenever feasible. The applicant is admitted by the decision of the chair, the program director, and the admissions officer in consultation with the departmental graduate faculty.

Prerequisites

It is recommended that the following courses be completed before entering the graduate program: algebra, trigonometry, general physics, inorganic and organic chemistry, general biology or zoology, comparative anatomy, embryology, genetics, cell biology or general physiology. A grade-point average above 3.0 is necessary. The aptitude portion and an advanced section of the graduate record examination are generally required. Also, three letters of recommendation from persons who can best evaluate the applicant's potential for graduate study should be mailed to the Department of Anatomy separately. Applicants desiring consideration for financial aid should complete the application process as early as possible.

Research

The first year of study consists of the introduction to research in one or more laboratories and course work within the Department of Anatomy. The courses include gross anatomy, microanatomy, neurobiology, and a seminar in anatomy. A combination of these courses and others in other basic medical sciences (such as biochemistry, cell biology, pathology, and physiology) and advanced anatomy courses are chosen to meet the individual's need. Students are in good standing while a minimum 3.0 overall grade-point average is maintained.

Seminars

The student learns to present scientific results and conclusions by giving departmental seminars and is expected to participate in laboratory teaching to professional students. Interaction among graduate students contributes significantly to the students' education.

This program allows flexibility for each student. The precise plan of study is designed by the student and an advisory committee composed of five faculty members selected by the student.

Candidacy

To be admitted to candidacy for the Ph.D. degree, the student must pass the preliminary examination, which consists primarily of a thoroughly comprehended and articulated plan for the research project to be undertaken for the dissertation. This part of the preliminary examination is preceded by a separate research proposal clearly defining another problem in the anatomical sciences and detailing an experiment designed to answer it. Both proposals are to be presented in writing and orally and defended before the candidate's committee and the faculty of the department.

Dissertation

To be recommended for the Ph.D. degree, each student must satisfactorily complete a dissertation based on original research and defend the dissertation at an oral examination. Success in this research experience is the core of the degree.

Students present their findings at scientific meetings, such as those of the American Association of Anatomists, Neurochemistry Society, Society for Neuroscience, and Orthopedic Research Society.

Master of Science

The master's program in anatomy is offered primarily for students in certain specialized fields, such as physical therapy or in a conjoint program in dentistry or medicine. Its purpose is to arouse curiosity in and provide direct experience of scientific investigation in anatomy. It is not necessary for the student to complete the M.S. degree in order to qualify for admission into the Ph.D. program, although the student may elect to complete the requirements for this degree in progress toward the Ph.D.

An applicant who shows a special need for the M.S. degree must generally be as well qualified as applicants to the doctoral program. The M.S. student must complete courses in gross anatomy and microanatomy and six-to-nine hours of required and elective courses. A 2.75 grade-point average must be maintained. In addition to course work, the student must complete a thesis based on original research and defend the thesis at an oral comprehensive examination.

Instruction

Instruction is as indicated by the titles of the individual courses. Where this is not specified, e.g. 312 *Special Topics in Anatomy*, the particular themes chosen underpin the current research in the department and match the students' interests at the time.

Research

Research areas include: the molecular biology of myelin, developmental neurochemistry and brain defects resulting from malnutrition or the misuse of drugs, *in vivo* microscopy of hepatic and splenic microcirculations and their response to pharmacological agents, neuroanatomy and neurophysiology of somatosensory and auditory systems, cytochemistry and behavior in culture of astrocytes, lung neuroendocrinology, lung macrophages and occupational disease, scanning electron microscopy and quantitative electron-microprobe analysis of cell-drug interactions, and orthopedic research on ligament healing and mathematically-modelled joint motion. Some of this research involves collaboration with other basic science or clinical departments.

Anatomy (ANAT)

303. *Conceptual and Applied Anatomy.* (For medical and a limited number of regular full-time graduate students in the medical basic sciences.) I. 10 hr. PR: Medical student standing or consent of chairperson. Gross anatomical study of the human body emphasizing conceptual, developmental, and clinically-related concepts.

305. *Microanatomy.* (For medical students.) II. 5 hr. PR: Medical student standing or consent of chairperson. Cells, tissues, and organs.

308. *Neuroanatomy.* (For students in physical therapy and a limited number of regular full-time graduate students in the medical basic sciences, and students in other health sciences.) II. 2 hr. PR: Consent of instructor or chairperson. Gross and microscopic structure of the central nervous system.

309. *Microanatomy and Organology.* (For dental students and a limited number of regular full-time graduate students in the medical basic sciences.) I. 5 hr. PR: Dental student standing or consent of chairperson. Cells, tissues, and organs.

312. *Special Topics in Anatomy.* I, II. 2-4 hr. per. sem. PR: ANAT 301 or 324; and ANAT 305 or 309; consent of chairperson. Different topics of current interest in anatomy that are not included in the regular graduate courses.

314. *Applied Anatomy.* I, II. 2-6 hr. per sem. PR: Consent of instructor or chairperson. Detailed study of anatomy adapted to the needs of the individual student.

316. *Craniofacial Growth and Maturation.* I. 1 hr. PR: Consent of instructor. The current concepts of craniofacial growth and maturation are presented and integrated for application to clinical problems.

318. *Oral Histology and Embryology.* (For dental students and a limited number of regular full-time graduate students in the medical basic sciences.) II. 2 hr. PR: Dental student standing or consent of instructor or chairperson. Structure, function, and development of oral tissues.

319. *Advanced Head and Neck Anatomy.* II. 1 hr. PR: Dental, medical, or graduate student, or consent. Advanced head and neck craniofacial embryology and related functions as they apply to specialties in dental or medical practice.

324. *Human Gross Anatomy.* (For dental students and a limited number of regular, full-time graduate students in the medical basic sciences.) 7 hr. PR: Dental student standing or consent of chairperson. Human anatomy including cadaver dissection for dental students. 4 hr. lec., 3 hr. lab.

397. *Master's Degree Research or Thesis*. I, II, S. PR: Consent of instructor or chairperson. (May be repeated as needed with permission). 1-15 hr.

401. *Advanced Gross Anatomy*. I, II. 2-6 hr. per sem. PR: ANAT 301,302, 304, or 324, and consent of instructor or chairperson. Morphological and functional analysis of a selected region, with dissection.

402. *Advanced Developmental Anatomy*. II. 2-4 per sem. PR: ANAT 301, 302, 304, and consent of instructor or chairperson. Detailed developmental anatomy of the fetal period and infancy. With dissections and analysis of variations and malformations.

403. *Seminar*. I, II. 1-6 hr. (1 hr. per sem.) (Course may be repeated.) PR: Consent of instructor or chairperson. Special topics of current or historical interest.

405. *Experimental Embryology*. II. (Alternate years.) 3 hr. PR: Embryology and cellular physiology and biochemistry and consent of instructor or chairperson. Development, differentiation, and regeneration.

406. *Advanced Neuroanatomy*. I. 2-4 hr. per sem. (Course may be repeated.) PR: CCMD 375 and consent of instructor or chairperson. Detailed study of selected areas of the nervous system.

408. *Histochemistry*. II. 3 hr. PR: ANAT 305 or 309, biochemistry, and consent of instructor or chairperson. Histochemical theory and techniques. (Offered in odd numbered years.)

451. *Advanced Microanatomy*. I, II, or S. 2-4 hr. PR: ANAT 305 or 309, or BIOL 263 and consent of instructor or chairperson. An extension of the major topics included in ANAT 305 or 309. Special emphasis on recent contributions.

490. *Teaching Practicum I and II*. 1-3 hr. Consent of chairperson. Supervised practice in college teaching of anatomy.

491. *Advanced Anatomy*. I, II. 1-6 hr. PR: Consent of chairperson.

492. *Directed Study*. I, II, S. 1-6 hr. Directed study, readings, and research.

493. *Special Topics*. I, II, S. 1-6 hr. A study of contemporary topics selected from recent developments in the field.

494. *Special Seminars*. I, II, S. Special seminars arranged for advanced graduate students.

495. *Independent Study*. I, II, S. 1-6 hr. Faculty supervised study of topics not available through regular course offerings.

496. *Graduate Seminar*. 1 hr. PR: Consent. It is anticipated that each graduate student will present at least one seminar to the assembled faculty and graduate student body of his/her program. (Graded S/U)

497. *Research*. I, II, S. 1-15 hr. PR: Consent of instructor or chairperson. (May be repeated as needed with permission.)

Biochemistry

Diana S. Beattie, Chairperson of the Department

Brad Hillgartner, Graduate Coordinator

3123 Health Sciences North

Degrees Offered: Master of Science, Doctor of Philosophy

Graduate programs in the Department of Biochemistry are designed to assist students in the development of their own capabilities for independent thought and research. All students are provided with a strong biochemistry background; however, the program has sufficient flexibility to allow individual students to select advanced specialty courses in biochemistry which are of particular importance to their career goals. Faculty research problems are of current interest and are diverse, reflecting the broad spectrum of areas encompassing biochemistry.

Prerequisites

A prospective graduate student should hold a bachelor's degree with a science major and should have successfully completed courses in qualitative-quantitative chemical analysis, organic chemistry, calculus, physics, and physical chemistry. In some cases, a deficiency in the above may be made up after admission into the program.

Application Process

Application is made by submission of the following items to the Department of Biochemistry:

- The completed departmental application form (sent on request);
- Three letters of recommendation from professors who can evaluate the student's present abilities and potential;
- Official transcript of the applicant's college grades; and
- Official copy of Graduate Record Examination scores, preferably including an advanced subject test in chemistry, biology, or biochemistry, cell or molecular biology.

Due to the sequence of courses, entrance in the fall is preferred. Application material and program details may be obtained by writing: The Graduate Coordinator, Department of Biochemistry, School of Medicine, West Virginia University, P.O. Box 9142, Morgantown, WV 26506-9142. The deadline for receipt of applications and supporting documents by the department is June 1; to be considered for financial support, applications should be submitted by February 1.

Course Work

To assure that all students become familiar with the basic principles of biochemistry, the first year of the doctor of philosophy (Ph.D.) program is devoted primarily to course work. In addition to formal courses during the first semester, students participate in a laboratory program which involves all faculty members. The laboratory experience is designed to introduce students to basic biochemistry research skills. During the second semester, students will undertake research in at least two laboratories of their choice.

Research Advisor

Upon successful completion of the first year, students will choose a dissertation research advisor, at which time emphasis will be placed on research. During the second year, specialized courses in biochemistry will be offered as the students continue their research programs. During subsequent years, the students emphasize independent dissertation research, and a few formal courses are taken.

An essential component of the Ph.D. program is participation in departmental journal clubs and seminars. Both students and faculty participate; thus, students learn to organize effectively and present research material to a large group of people.

Completion of the Ph.D. program is realized when the student successfully presents the research results to both the Department of Biochemistry and a graduate advisory committee. Typically, four years are required to realize this goal.

Master of Science

The Department of Biochemistry offers the thesis master's degree. This program involves completion of a master's research project in addition to formal course work. Two to three years are generally required to complete the M.S. program.

Research

Regulation of intermediary metabolism. Structure and function of nucleic acids. Chemistry of enzymes and serum proteins. Nutritional oncology. Secretory mechanisms. Biogenesis of membranes. Regulation of gene expression. RNA processing. Protein structure and function. Retroviral genetics.

Biochemistry (BIOC)

231. *General Biochemistry*. I. 7 hr. PR: general chemistry, organic chemistry. (For medical students; others by consent.) Consists of seven main lectures, one clinical correlation lecture and one problem session per week.

239. *Clinical Chemical Techniques*. II. 4 hr. PR: BIOC 139, 231 or equiv. (Primarily for medical technology students; open to other qualified students by consent.)

305. *General Biochemistry*. II. 4 hr. PR: Inorganic chemistry, organic chemistry, and consent. (For dental and graduate students.) Lecture, conference, and demonstration.

391. *Advanced Topics*. I, II, S. Variable 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

397. *Master's Degree Research or Thesis*. I, II, S. Variable 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

399. *Special Topics*. I, II. 1-2 hr. PR: Consent. Journal Club, Teaching and Laboratory Rotations.

490. *Teaching Practicum I and II*. 1-3 hr. Consent of chairperson. Supervised practice in college teaching of biochemistry. Graded as S or U.

491. *Advanced Study*. I, II. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures. {Physical techniques in biochemistry; nucleic acids and protein biosynthesis; enzymology and protein chemistry; (each topic—one semester; offered alternate years). Designed primarily for students who will do research in biochemistry and molecular biology. (Nucleic Acids—Fall, 1993; Enzymology—Spring, 1994.)}

496. *Graduate Seminar*. I, II. 1 hr. PR: Consent. Presentation and discussion of special topics.

497. *Research*. I, II, S. 1-15 hr. PR: Consent.

Center on Aging/Education Unit

The WVU Center on Aging, part of the Robert C. Byrd Health Sciences Center School of Medicine, reflects the University's commitment to increased understanding of the aging process and support efforts to improve the quality of life for elderly persons, particularly the rural elderly of Appalachia. The Center on Aging promotes and coordinates interdisciplinary teaching, research, clinical service, and community outreach service in aging at WVU through the activities of its constituent units.

The Education Unit of the Center on Aging offers a graduate certification program in multidisciplinary gerontology for graduate students pursuing advanced degrees in other fields and special graduate students who are non-degree candidates.

The certificate program requires a minimum of 15 graduate hours including *Fundamentals of Gerontology*, which is cross-listed as Biology 375 and Psychology 375, and nine elective hours selected on the basis of appropriateness to the individual student's goals from an approved pool of aging-related courses. All students will enroll for three hours in research and complete a required research project and paper that demonstrates linkage between gerontology and the student's primary discipline. This capstone paper will be presented at a gerontology research seminar coordinated by the education unit.

Candidates for the graduate certificate must meet regular WVU graduate admission requirements and must be able to demonstrate elementary knowledge of gerontology, i.e. material covered in MDS 50 *Introduction to Gerontology*. Program participants must maintain a minimum grade-point average of 3.0 in certificate course work.

Other University units involved in teaching and research in human aging include the College of Agriculture and Forestry, the Eberly College of Arts and Sciences, the College of Human Resources and Education, the School of Nursing, the School of Pharmacy, the School of Physical Education, the School of Social Work, and Extension Services.

The education unit's library collection augments the gerontology holdings of other campus libraries and is open to the entire community Monday through Friday, 8:30 A.M. - 5:00 P.M.

Further information, assistance in academic program planning in multidisciplinary gerontology, and registration forms may be obtained from the West Virginia University Center on Aging/Education Unit, Chestnut Ridge Professional Bldg, Suite 12, 918 Chestnut Ridge Road, P.O. Box 9127, Morgantown, WV 26506-9127. (Telephone (304)293-2081).

Gerontology (GERN)

291/391. *Special Topics*. I, II. 1-3 hr. PR: Consent. Special problems for undergraduate and graduate students working on certificate programs. Topics change from semester to semester. Students can enroll more than once.

Note: *The Aging Woman* is the topic for 291 section b and 391 section a.

Other Courses

Biology/Psychology 375. *Fundamentals of Gerontology*. II. 3 hr. PR: MDS 50 or consent. An advanced multidisciplinary examination of current research in biological, psychological, and sociological issues of human aging and the ways in which these impinge on the individual to create both problems and new opportunities. (Also listed as PSYC 375.)

Counseling 382. *Special Topics*. I, II, S. 1-6 hr. PR: Advanced standing and consent. Independent study and directed readings in specialized areas of counseling and guidance. (Some sections of COUN 382 have prerequisite requirements. Check with the instructor.)

Note: Students should take the section titled *Gerontological Counseling*.

For a complete listing of aging-related courses including graduate certificate electives, contact the Gerontology Center, Chestnut Ridge Professional Building, 918 Chestnut Ridge Road, P.O. Box 9127, Morgantown, WV 26506-6630. Telephone (304) 293-2081.

Community Health Promotion

Kenard McPherson, Program Director
147 Coliseum

Degree Offered: Master of Science

The Community Health Promotion Program offers a master of science degree with majors in community health education and school health education. The community health education degree includes a clinical or research option. The major purpose of the program is to prepare health professionals to interface between communities and health care systems. Community health professionals serve as partners in the health care team and provide leadership in planning, developing, organizing, implementing, and evaluating health promotion programs.

Health promotion graduates may be employed as classroom health educators, community health educators, wellness center program managers, and health promotion educators in corporations, health agencies, or state/county health departments.

Admission

Applicants in either degree program must hold a bachelor's degree from an accredited college or university, meet university admission standards, and demonstrate academic achievement in previous studies. Applicants for the school health education master's program must hold a West Virginia teaching certificate or be in the process of obtaining certification.

Grade-Point Average

Applicants must have attained a GPA of 3.00 or better at the bachelor's or master's level to be accepted as a regular graduate student. Applicants with a GPA between 2.50 and 2.99 may be accepted on a provisional basis. Applicants meeting admission requirements may not be accepted if the maximum enrollment level has been reached. Preferential admission is given to the best qualified students fulfilling one or more of the following qualifications:

- At least two years of full-time work experience in the health or human services field.
- Breadth and depth of academic preparation in the biological or health sciences.
- Bachelor's degree in health education or health promotion.

Application Deadline

Applicants are regularly admitted for the fall term. Preference is given to early applicants meeting all admission requirements by March 1 of the year in which the applicant intends to begin the master's program. Under unusual circumstances, applicants may be admitted during the spring or summer terms.

Community Health Education Course Work Requirements

Students in the community health education master's program must complete either a clinical or research emphasis. Students selecting the **clinical emphasis** complete 48 hours of study (36 hours of course work and a 12-hour practicum). Required courses are: CHPR 310, 311, 312, 334, 335, 338, and 348, and COMM 391. In addition to the 24 hours of required courses, students must take 12 hours of electives approved by the student's faculty committee. They may choose from local areas such as substance abuse,

injury control, wellness, evaluation, and epidemiology. The practicum, CHPR 350, is designed for students without professional health promotion-related work experience. For students without work experience, 12 hours of CHPR 350 is required. For those with two or more years of professional health promotion-related work experience, the work experience may be accepted in lieu of the practicum. Partial credit for CHPR 350 for students with less than two years of professional health promotion-related work experience may be determined by the student's faculty committee.

Students selecting the **research emphasis** must complete 36 credit hours. Required courses are: CHPR 310, 311, 312, 334, 335, and 396 (six hours), and COMM 391. In addition to 27 hours of required courses, students must take nine hours of electives from health promotion, epidemiology, statistics, research, and scientific methods courses. Electives must be approved by the student's faculty committee.

A customized program may be designed for students with extraordinary professional experience or academic preparation. Such a program must be approved by the faculty committee and incorporated into the student's plan of study before completing any course work toward the community health promotion degree.

The school health education master's degree program is open *only* to students who hold a West Virginia teaching certificate or are eligible for certification. Students must complete 48 credit hours. Required courses are: CHPR 301, 307, 220 **or** 309, 310, 311, 312, 333, 334, 335, 338, 391 *Advanced Topics: Health Concepts*, and 391 *Advanced Topics: Performance Assessment*. In addition to the 36 hours of required courses, students must take 12 hours of electives approved by the faculty committee.

The graduate program in school health education is undergoing review at this time. For more up-to-date information, please contact the program director.

Community Health Promotion (CHPR)

220. *Drug and Alcohol Abuse Prevention*. 3 hr. Experiences designed to prevent the development of abusive drug-taking relationships by focusing on psychological variables such as self-esteem, coping skills, and development of support networks.

290. *Women and Health*. 3 hr. Examination of theories, myths, and practices surrounding women's physical and mental health from both historical and present-day perspectives. Exploration of specific health issues and controversies and the rise of the women's health movement.

301. *Advanced School Health*. 3 hr. PR: Graduate standing and consent. Analysis of problems in school health services, healthful school living, nature of health education, and scope of health instruction which confronts teachers and administrators.

307. *Community Health: Human Sexuality*. 3 hr. PR: Consent. Analysis of sex-related issues including parenting, sex education, sexual sanctions, pornography, sexual dysfunctions, and sexual variance. Designed for teachers, health professionals, and interested lay people.

309. *Community Health: Drug Education*. 3 hr. PR: Consent. Designed to help students learn appropriate components of a drug education program, gain an understanding of drug taking in this society, and acquire insights into dependent behaviors.

310. *Introduction to Health Promotion*. I. 3 hr. Identifies the elements of health promotion to assist students in identifying program goals and professional goals in health promotion.
311. *Community Health Promotion*. I. 3 hr. Addresses various aspects of community health promotion, including theories of community health program models; educational, social, and environmental interventions; demographic and epidemiological analyses.
312. *Health Behavior Analysis*. I. 3 hr. The focus of this course is on the role of individual behavior in attaining health. Integration of the concepts of health education and behavioral science to facilitate changes in health behavior is addressed.
314. *Injury Prevention and Control*. I. 3 hr. The injury control problem is examined as a public health concern. Strategies and programs for injury prevention are studied for implementation with target groups who are overrepresented within the injury problem.
332. *Safety Education Principles and Content*. 3 hr. PR: Consent. Study and analysis of content areas usually recommended for instructional programs within the field of safety, with emphasis on structured learning experiences.
333. *Foundations of Wellness*. I. 3 hr. Wellness is examined as a component of health promotion. A wellness lifestyle is fundamental to promoting a holistic wellness concept. Quality of life issues and programs are explored for a variety of audiences.
334. *Health Promotion Research and Statistics*. II. 3 hr. PR: CHPR 310, 311, 312, or consent. This course is designed to introduce students to the basic elements of conducting effective evaluation of health promotion programs.
335. *Management for Health Promotion Professions*. 3 hr. PR: CHPR 310, 311, 312, or consent. This course provides health promotion students with the essential skills to be effective managers in the community health environment.
338. *Design of Health Promotion Programs*. I, II. 3 hr. PR: CHPR 310, 311, and 312, or consent. This course is designed to convey theory and practice for developing health promotion programs. The course addresses design principles appropriate to a wide range of health promotion programs.
348. *Applied Health Promotion Program*. I, II. 3 hr. PR: CHPR 338 or concurrent. Students will apply information from CHPR 338 and other foundation courses in designing a health promotion program for a health agency or enterprise. Students will defend their program before their faculty committee.
350. *Practicum*. PR: Majority of plan of study completed, and consent. Students are assigned to a field placement based on prior health promotion work experience. Under the supervision of faculty, students assume major responsibility for a program with a community health promotion organization.
355. *Traffic Safety Management*. 3 hr. PR: Consent. Elements of traffic safety management in public and private sectors are examined. Role of management organization, approaches, and programs is examined in light of the need for a safe and efficient highway transportation system.

357. *Alcohol Safety Programs*. 3 hr. Topics include alcohol programming in schools, community, and the workplace. Approaches, programs, and materials are examined for use at the local level. Scientific reports are studied to determine the effectiveness of various approaches to the alcohol problem.

373. *Professional Development*. 1-6 hr. PR: Consent. Specially designed experiences for those interested in advancing professional skills in a particular specialty.

391. *Advanced Topics*. 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

397. *Master's Degree Research or Thesis*. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

490. *Teaching Practicum I and II*. 1-3 hr. Consent of chairperson. Supervised practices in college teaching of anatomy. Graded S or U.

491. *Advanced Study*. I, II. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

497. *Research*. I, II, S. 1-15 hr. PR: Consent of instructor or chairperson. (May be repeated as needed with permission.)

Exercise Physiology

Rachel Yeater, Director of Exercise Physiology; Graduate Coordinator
131 Coliseum

Degrees Offered: Master of Science, Doctor of Education

(The doctor of education is temporarily administered by the School of Physical Education.)

The exercise physiology master of science program prepares students for careers in adult fitness, hospital- or corporate-based wellness programs, or cardiac rehabilitation. Students specialize by completing a 200 hour internship. A thesis option is also available.

Admission

Fifteen students are accepted once a year (by May 30) on a competitive basis. Applicants must have a baccalaureate degree in an allied field from an accredited institution with a minimum undergraduate grade-point average of 2.75 (based on A = 4.0 grade points). Three letters of reference are required. Applicants are selected for admission on the basis of scholastic standing (special attention is given to science grades), and recommendations. The graduate application, three letters of reference, and college transcripts must be submitted by March 15.

Required Courses

A minimum of 36 semester hours of credit is required for graduation. The following courses or course equivalents are required:

ATTR 219 <i>Gross Anatomy</i>	3 hr..
PSIO 241 <i>Mechanisms of Body Function</i>	4 hr..
PHAR 249 <i>Drugs and Medicines</i>	3 hr.
HN&F 310 <i>Human Nutrition</i>	3 hr.

SS 315 <i>Research Methodology in Physical Education</i>	3 hr.
EXPH 367 <i>Theories of Sport Physiology</i>	3 hr.
STAT 311 <i>Statistical Methods</i>	3 hr.
EXPH 491 <i>Advanced Study (Laboratory Techniques)</i>	3 hr.
EXPH 491 <i>Advanced Study (Stress Testing)</i>	3-6 hr.
EXPH 491 <i>Advanced Study (Diabetes and Exercise)</i>	3 hr.
EXPH 491 <i>Advanced Study (Internship)</i>	6 hr.

OR

EXPH 397 <i>Research</i>	3 hr.
EXPH 498 <i>Dissertation/Thesis Seminar</i>	3 hr.

Doctor of Education

The major objectives of the doctoral program are to prepare professionals in exercise physiology who have (1) cognitive expertise in exercise physiology, (2) clinical skills in both preventive and rehabilitation medicine including assessment of functional capacity and exercise prescription, and (3) expertise in conducting applied and/or clinical research.

Admission

Students must have a master's degree with a minimum graduate grade-point average of 3.0, two letters of recommendation from professors involved with the student's graduate work, an official transcript of all college work, and the results of the Graduate Record Examination or the Miller Analogies Test. The minimum recommended score on the Graduate Record Examination is 1000 for the verbal and quantitative scores combined. The minimum recommended score on the Miller Analogies Test is 50. However, students will not be accepted nor denied acceptance based solely on test score. An interview with the program faculty is required. All students will be admitted provisionally pending completion of a minimum of 18 hours of course work with grades of B or higher and two semesters of clinical laboratory work. Clinical work will be evaluated by: (1) a subjective judgment by the program faculty concerning the student's ability to positively interact with patients and/or exercise program participants, and (2) demonstration of competency in clinical skills, which includes such things as stress testing, ECG interpretation, and exercise prescription for symptomatic and asymptomatic patients.

Graduate Committee

After the provisional year, students who are accepted as regular graduate students will work with a chairperson to form a graduate committee. The committee and student will develop a plan of study which will include required course work for the program and the method and areas for a comprehensive exam. If the student has not completed the following basic science requirements, they will be required as part of the doctoral program. If students do not have an M.S. in exercise physiology, they will be required to take the M.S.-level required courses.

Basic Science Requirements

8 hours biology	(equivalent of WVU BIOL 1, 2, 3, 4)
8 hours physics	(equivalent of WVU PHYS 1 and 2)
8 hours general chemistry	(equivalent of WVU CHEM 15 and 16)
8 hours organic chemistry	(equivalent of WVU CHEM 133 and 134)
3 hours calculus	(equivalent of WVU MATH 128)

M.S.-Level Required Courses

ATTR 219 <i>Gross Anatomy</i>	3 hr.
PSIO 241 <i>Mechanisms of Body Functions</i>	3 hr.
PHAR 249 <i>Drugs and Medicines</i>	3 hr.
EXPH 367 <i>Theories of Sport Physiology</i>	3 hr.
EXPH 491 <i>Laboratory Techniques/Methods</i>	3 hr.
EXPH 492 <i>Stress Testing</i>	3 hr.

Required Doctoral Courses

*Graduate-level biochemistry courses	3 hr.
Medical Physiology 344	5 hr.
Medical Physiology 345	5 hr.
EXPH 491 <i>Advanced Study Exercise Physiology</i>	9 hr.
EXPH 491 <i>Advanced Study Clinical Internship</i>	3-12 hr.
EXPH 496 <i>Graduate Seminar</i>	12 hr.
*Statistics	9 hr.

*Specific courses to be determined by doctoral committee.

Seminar

The graduate seminar is required during all semesters of doctoral work; students present a research article each week during spring and fall semester for 3 hours of graduate credit. Students designate a minor area such as cardiac rehabilitation, reproductive physiology, or nutrition and take 12 to 15 hours of course work in this area. Students typically spend three to five years completing the program depending on whether they have a master's degree in exercise physiology before entering.

Comprehensive Examination/Dissertation

Following completion of the course work, the student will take a written comprehensive examination on the areas specified on the doctoral plan of study. If the student successfully passes the comprehensive exam, the student can orally defend to the graduate committee a prospectus for the dissertation. If the student fails the comprehensive exam the second time, the student is dismissed from the program.

The student must complete a dissertation that makes a contribution to knowledge in applied exercise physiology and pass an oral examination based primarily upon the dissertation. After successful completion of the oral examination and submission of the final copy of the dissertation, the candidate will be recommended for the degree.

Exercise Physiology (EX PH)

360. *Biochemical Analysis of Sport and Physical Activity*. II. 3 hr. PR: SS 164 and 165 or equiv.; SS 315. Advanced principles of body mechanisms and analysis of muscle and joint actions in coordinated movement and neuromuscular physiology.

367. *Theories of Sport Physiology*. I, S. 3 hr. PR: SS 315. Thorough and workable knowledge of principles involved in the interactions of muscles and nerves, reflexes, metabolism, cardiopulmonary function, environmental physiology, and the practical application of work physiology.

391. *Advanced Topics*. 1-6 hr. PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

397. *Master's Degree Research or Thesis*. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

490. *Practicum*. I, II, S. 1-3 hr. PR: Consent. Supervised practice in teaching exercise physiology.

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects that are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

492. *Directed Study*. I, II, S. 1-6 hr. Directed study, readings, and research.

493. *Special Topics*. I, II, S. 1-6 hr. A study of contemporary topics selected from recent developments in the field.

494. *Special Seminars*. I, II, S. Special seminars arranged for advanced graduate students.

495. *Independent Study*. I, II, S. 1-6 hr. Faculty supervised study of topics not available through regular course offerings.

496. *Graduate Seminar*. 1 hr. PR: Consent. It is anticipated that each graduate student will present at least one seminar to the assembled faculty and graduate student body of his/her program. (Graded S/U)

497. *Research*. 1-15 hr.

498. *Thesis*. 2-4 hr. PR: Consent.

499. *Graduate Colloquium*. 1-6 hr. PR: Consent. For graduate students not seeking course work but who wish to meet residence requirements, use University facilities, and participate in academic and cultural programs.

Medical Technology

Jean D. Holter, *Director of the Program; Graduate Coordinator*

2138 Health Sciences North

Degree Offered: Master of Science

The WVU medical technology graduate program prepares graduate medical technologists for positions either as administrators and teachers in medical technology educational programs or as supervisors and administrators of the clinical laboratory. The primary objective is to assist in development of knowledge in an area in administration, in education, or a special area of interest selected by the student, which may be a special medical laboratory science as the specific area applies to laboratory medicine. Areas of emphasis include clinical chemistry, clinical microbiology, hematology, and immuno-hematology. The specific course work requirements for the master of science degree rests with the graduate advisor in the student's specific area of interest.

Admission

Applicants must have a baccalaureate degree in medical technology from an accredited institution or a baccalaureate degree in an allied field and be a certified medical technologist with an acceptable certifying agency. Information concerning the medical

technology undergraduate program may be found in the *WVU Health Sciences Catalog* and the *WVU Undergraduate Catalog*.

Basis for Evaluation The area of concentration in medical technology desired by the student is considered in the evaluation of the undergraduate as follows:

- Individuals who desire to do special study in clinical chemistry, hematology, or immunohematology must have completed eight hours of physics, three hours of mathematics, and four hours of organic chemistry on the college level.
 - Individuals who desire to do special study in microbiology must have completed four hours of organic chemistry and 16 hours of biological sciences.
 - A minimum of one year's experience in a clinical laboratory is required for admission.
- Students will be required to make up deficiencies in the above, as well as other deficiencies deemed necessary by the advisor.

GPA Applicants must have a minimum undergraduate grade-point average of 2.5 (based on A = 4.0 grade points) for admission.

GRE All applicants are required to take the general aptitude part of the Graduate Record Examination. Results should be sent to the WVU Medical Technology Programs Office, P.O. Box 9211, Morgantown, WV 26506-9211.

Letters of Reference Two letters of reference must be on file in the Medical Technology Office. One letter should be from the major advisor in the undergraduate college and another from the immediate supervisor of the applicant's present position. An interview will be requested for all applicants who meet the requirements for admission.

Application Applicants are selected for admission on the basis of scholastic standing, recommendations, and interest in the field of medical technology. The number of applicants accepted is necessarily limited by the available facilities; and in general, applicants with the most experience are considered first.

1. A preliminary application is filed in the Medical Technology Programs Office.
2. Two letters of recommendation are sent to the Medical Technology Programs Office.

After approval of the preliminary application, the admission procedure is the same as for other WVU graduate programs.

A personal interview is required before final admission to the program. This interview will give the graduate student an opportunity to evaluate the program and to determine if the program will offer the educational opportunities which the student desires.

Course of Study

It is expected that the students entering the graduate program in medical technology will have a goal in mind and a special field of interest in medical technology. A minimum of 36 semester hours of credit, including a research problem, is required. The student selects a major area of concentration from either education, supervision, or administration, and a minor area from clinical microbiology, clinical chemistry, clinical hematology, or immunohematology. A minimum of 15 semester hours of course work from the following courses is required, depending upon the major area of concentration.

ED P 320 *Introduction to Research* (required).

- If the major area is **education**, the following three-hour courses are available:
 - CHPR 320 *Roles and Functions of Health Education*
 - ED A 320 *Personnel Administration*
 - ED A 351 *Administrative Procedures in Adult Education*

ED A 462 *Higher Education Law*
ED A 463 *Higher Education Finance*
ED F 320 *Philosophic Systems and Education*.

• If the major area is **supervision and/or administration**, the following three-hour courses are available:

ED A 320 *Personnel Administration*
ED A 462 *Higher Education Law*
ED A 463 *Higher Education Finance*
PUBA 341 *Administrative Organization and Management*
PUBA 344 *Public Personnel Administration*
PUBA 345 *Public Administration and Policy Development*

• Other three-hour courses available for **either major** for additional credit are:

ED P 231 *Sampling Methods*
ED P 260 *Medical and Microcomputers in Instruction*
ED P 301 *Introductory Behavior Analysis: Human Resources*
ED P 321 *Design of Experiments*
ED P 343 *Statistical Analysis in Education*
ED P 364 *Precision Teaching*
ED P 370 *Programmatic Research*
CHPR 308 *Community Health: Death Education*
CHPR 309 *Community Health: Drug Education*

Recommended:

ED P 311 *Statistical Methods*,
STAT 311 *Statistical Methods*, **or**
CCMD 311 *Biostatistics*

Other courses to complete 36 semester hours are selected by the student and the advisor in the area of concentration selected by the student. Students may select courses in departments in schools other than the School of Medicine.

Minimum Hours

All students must complete a minimum of 18 semester hours in a science related to medical technology including seminar (three hours) and problem study (six hours).

In addition, at the discretion of the student's advisor, other requirements in teaching, supervision, and administration may be necessary.

Plan of Study

The advisor formulates with the student a plan of study for the entire graduate program. This plan is usually made at the end of the first semester of the student's graduate study. The plan of study is signed by the advisor and student and sent to the Health Sciences Graduate Program Office for approval. The original plan of study is returned to the Medical Technology Office to be put in the student's file.

A final written comprehensive examination in the major and minor interest areas is given approximately one month before the oral defense. An oral defense of the problem study is given about one month after submission of the problem study in its final form to the student's graduate committee.

Time Limitations

All requirements for the master of science degree, as outlined in this catalog, must be fulfilled. These requirements can be fulfilled in three semesters of full-time work, but ordinarily at least four semesters are required for completion of the degree requirements.

Degree candidates must have a 3.0 grade-point average and must have removed all incomplete grades and deficiencies. All students must complete a problem study (see MTEC 397).

Medical Technology (MTEC)

300. *Seminar*. I, II, S. 1 hr. Seminars include topics in laboratory management and education in medical technology, and timely topics. Minimum of three semester hours to include all three topics is required of all graduate students in the medical technology program.

391. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

397. *Research*. I, II, S. 1-15 hr. Student is required to pursue study on a problem in the student's area of concentration. This study is reported in a thesis-style manuscript. For this study and report, the student registers in MTEC 397. Total number of hours earned in MTEC 397 is determined by the student's advisor. As many as nine semester hours may be taken during one semester or, by arrangement with the advisor, credit hours may be taken over several semesters. In the final compilation for degree requirements, only six semester hours in MTEC 397 will be counted toward fulfillment of the 36 required semester hours for the degree even though the student may have registered for as many as 15 hours in MTEC 397.

Microbiology and Immunology

John B. Barnett, Chairperson of the Department

James M. Sheil, Graduate Coordinator

2095 Health Sciences Center - North

e-mail: Jbarnett@wvumbim1.hsc.wvu.edu

<http://www.hsc.wvu.edu>

Degrees Offered: Master of Science, Doctor of Philosophy

The Department of Microbiology and Immunology offers programs of study leading to the degrees of master of science and doctor of philosophy in microbiology and immunology. Students with an undergraduate degree can apply to either the M.S. or Ph.D. program. The major purpose of graduate education in microbiology and immunology is research training. The basic philosophy of the department is that the students acquire a strong foundation in basic concepts of microbiology and immunology and have flexibility in choosing advanced course work in their specific areas of interest.

Application

Applicants to the graduate program of the Department of Microbiology and Immunology must have earned a bachelor or master's degree. Applicants should have a strong background in biological sciences, organic chemistry, physics, and mathematics. Applicants must submit a departmental application form, three letters of recommendation, and Graduate Record Exam (GRE) scores to the chairperson, Admissions Committee, Department of Microbiology and Immunology, Robert C. Byrd Health Sciences Center, West Virginia University, Morgantown, WV 26506-9177. In addition, all college transcripts and an official application for admission must be sent directly to the WVU Office of Admissions and Records, P.O. Box 6009, Morgantown, WV 26506-6009. Applicants for admission to a degree program should have a grade point average of 3.0 or better. GRE

scores are used as one of the selection criteria for admission to the department's graduate program. Although no minimum score is required for consideration, successful applicants usually have a combined score of 1500 or greater on the general GRE. International students must have a TOEFL score of 550. Admission to the department and award of assistantships is considered throughout the year and early application is encouraged. Applicants desiring financial aid should complete their application before March 1. All applications must be completed by June for fall admission.

Course Requirements

Every student must take the following courses or demonstrate proficiency by examination in each of the following areas: Microbiology (MBIM 317) *Graduate Microbiology and Immunology* and MBIM 391 *Advanced Topics* (laboratory rotation). In addition, two semesters of Cell and Molecular Biochemistry (BIOCH 399), are required. The remainder of the course work is selected by the student and the advisory committee from the graduate course offerings of department, school, or university. Enrollment in MBIM 496 Graduate Seminar is required each semester that the student is in residence. Full time students in the Department of Microbiology and Immunology are required to participate in teaching during each year of residence in the department.

Master of Science

The master of science program requires 30 hours of course work, of which at least 20 hours must be in microbiology and immunology. Six hours must be in research (MBIM 397 *Master's Degree Research and Thesis*). A thesis representing original research and a final oral examination are required. A grade-point average of at least 3.0 must be maintained throughout the program. In most cases, two years are needed to complete the M.S. program.

Doctor of Philosophy

Students with either a bachelor's or master's degree can apply to the Ph. D. program. Those with a bachelor's degree must complete the basic course requirements expected of an M.S. candidate. The doctoral candidate with an M.S. degree from another department must have had course work or demonstrate knowledge in microbiology, immunology, and biochemistry equivalent to that of a master's student in the department. In addition, the doctoral student will take additional course work as determined by the student's graduate research advisory committee. A minimum of nine hours in Microbiology 491 courses or selected advanced courses from other departments is required. Where appropriate, course work in related subjects such as computer science, cell biology, biochemistry or statistics will be required. MBIM 496 *Seminar* is a required course each semester that the student is in residence. The student will maintain a grade point average of 3.0 or better. The doctor of philosophy degree requires a dissertation representing the results of an original research investigation. Candidacy to the Ph.D. degree program requires a passing score on a comprehensive written exam on microbiology and immunology, and a preliminary oral examination. The written qualifying exam is given at the end of the first year of residence. The preliminary oral exam is normally held after two years of residence. Ph.D. candidates must pass a final oral examination in defense of the dissertation. This final oral examination is given after completion of the research project and submission of an acceptable dissertation. A minimum of three years are required to complete the Ph.D. program.

The Department of Microbiology and Immunology has informal journal clubs in immunology, virology, and in microbiology. These are designed to help students develop skills in reading, interpreting and discussing current research articles. All students are expected to participate in one or more journal clubs per year.

For application materials, a description of faculty research interests, guidelines for graduate students in the Department of Microbiology and Immunology, write to the Chairperson, Admissions and Scholarship Committee, Department of Microbiology, WVU Health Sciences Center, Morgantown, WV 26506-9177.

Areas of Current Research

Pathogenic Bacteriology: mode of action of microbial products in pathogenicity; oral microbiology; biology of spirochetes; microbial adherence.

Mycology: pathobiology of medical mycoses; environmental health research implications of fungal and algal toxicoses.

Physiology: nutrition and metabolism of a variety of pathogenic microorganisms, growth and protein synthesis in obligate intracellular bacteria.

Genetics: basic studies in the mechanisms of genetics including transfer of genetic information; recombinant DNA studies.

Virology: mechanism of viral replication and mutation.

Parasitology: host-parasite relationships between helminth parasites and insects and vertebrate hosts; endosymbionts in protozoa.

Immunology: developmental aspects of immunity, immunopathology of pulmonary disease; inflammatory response to inhaled organisms; mechanisms of T-cell function; effects of xenobiotic exposure on the immune system.

Tumor biology: mechanisms of oncogenesis; functional analysis of oncogenic proteins.

Other programs: detection of environmental pollutants; effect of environmental agents on host resistance.

Microbiology and Immunology (MBIM)

310. *Structure and Activities of Microorganisms*. II. 3 hr. PR or CONC.: Biochemistry, consent. Molecular biology of *E. coli* and other selected organisms.

317. *Special Problems in Microbiology*. I, II, S. 1-7 hr. per semester.

{A. *Special Problems in Basic Immunology*. I. 2 hr. PR: Consent.

B. *Special Problems in Microbiology*. II, S., VR. PR: Consent.

C. *Special Problems in Post Graduate Dental Microbiology*. II. 4 hr. PR: Consent.}

327. *Parasitology*. (For graduate students.) II. 4 hr. PR: Consent. Study of animal parasites and disease vectors with emphasis on disease manifestations, parasite biology, laboratory diagnosis, and current concepts in parasitological research.

391. *Advanced Topics. I, II, S*. Investigation of advanced topics not covered in regularly scheduled courses.

{A. *Laboratory Rotation*. I. 3 hr. PR: Consent; For graduate students in Microbiology and Immunology. Assigned study to develop research laboratory techniques. Graded S or U.

B. *Immunology*. I, II, S. VR. PR: Consent. Independent study in immunology.}

397. *Master's Degree Research or Thesis*. , II, S. 1-15 hr. PR: Graduate students in Microbiology and Immunology. Students may enroll more than once. Graded S or U.

490. *Teaching Practicum*. I and II. 1-3 hr. PR: Consent. Supervised practices in teaching of microbiology and immunology. Graded as S or U.

491. *Advanced Study*. I, II. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

{Pathogenic Bacteriology. I. 2 hr. PR: MBIM 301, 310 or equiv. Consent. Pathogenic bacteriology with an emphasis on the mechanisms of pathogenesis. Topics include microbial adherence, toxin production and mechanisms, and normal flora and disease.

{Molecular Genetics. I. 3 hr. PR: MBIM 310 or equiv. Consent. Molecular aspects of mutation, gene transfer mechanisms, genetic mapping, and genetic control using bacteria and bacteriophage systems as models.

{Microbial Metabolism. II. 2 hr. PR: MBIM 310, or equiv., biochemistry, consent. Physiology, metabolism, and regulation of representative microbial groups.

{Microbial Metabolism Laboratory. II. 1 hr. PR: Open to departmental graduate students only. Research techniques in metabolic regulation.

{Medical Mycology. I. 3 hr. PR: Consent. Advanced study of fungi of medical importance, including the pathobiology of mycoses and toxicoes.

{Molecular Virology. I. 3 hr. PR: MBIM 310, 301, or equiv., consent. Molecular biology of viruses that are important both biologically and medically. Includes a basic introduction to replication and genetics as well as current topics in molecular virology.

{Developmental Immunology. I. 3 hr. PR: Consent. Examines the development of the lymphoid components of the immune system (B and T lymphocytes) and interactions leading to effective immune responses.

{Cellular and Genetic Basis of the Immune Response. I. 3 hr. PR: Consent. Emphasis is on contemporary issues in understanding the genetic and cellular elements that impact immune responses.

{Contemporary Topics in Immunobiology II. 3 hr. PR: Consent. Detailed coverage of major issues of contemporary research in immunobiology.

{Retroviruses and Oncogenes. I. 3 hr. PR: Consent. Current concepts of neoplastic development; emphasis on origin and functions of oncogenes and their role in molecular oncology.

{Systems Immunology II. 3 hr. PR: Consent. An integrative systems approach to immunology stressing how immunologic recognition is translated into biologic consequences. Advanced treatment of different aspects of the efferent arm of immune responses.}

492. *Directed Study. I, II, S. 1-6 hr. Directed study, readings, and research.*

493. *Special Topics. I, II, S. 1-6 hr. A study of contemporary topics selected from recent developments in the field.*

494. *Special Seminars. I, II, S. Special seminars arranged for advanced graduate students.*

495. *Independent Study. I, II, S. 1-6 hr. Faculty supervised study of topics not available through regular course offerings.*

496. *Seminar. I, II. 1 hr. PR: Consent. Graduate students present at least one seminar to assembled faculty and students in Microbiology and Immunology. Graded as S or U.*

497. *Research. I, II, S. 1-15 hr. PR: Consent of instructor or chairperson. (May be repeated as needed with permission.)*

498. *Thesis. 2-4 hr. PR: Consent.*

499. *Graduate Colloquium*. 1-6 hr. PR: Consent. For graduate students not seeking course work but who wish to meet residence requirements, use University facilities, and participate in academic and cultural programs.

Pharmacology and Toxicology

William W. Fleming, Chairperson of the Department

Robert Craig, Graduate Coordinator

3151 Health Sciences North

Degrees Offered: Master of Science, Doctor of Philosophy

Pharmacology and toxicology involve all aspects of the action of drugs on living systems and their constituent parts. These range from the chemical reactions taking place within cells to the evaluation of a drug in the treatment of human disease. The Department of Pharmacology and Toxicology offers graduate studies leading to the degrees of master of science and doctor of philosophy, with research concentrations in such areas as cellular and molecular pharmacology, autonomic pharmacology, biochemical pharmacology, neuropharmacology, cardiovascular pharmacology, endocrine pharmacology, malarial chemotherapy, and renal, hepatic, and pulmonary toxicology.

Admission

Regular applicants for the graduate program in pharmacology and toxicology should present, as a minimum, the following undergraduate courses: one semester of biology; two semesters of physics; one semester of calculus; four semesters of chemistry including two semesters of organic chemistry. Two letters of recommendation from science professors, an official transcript, and the results of the Graduate Record Examination are also required. The prospective student should have a minimum 3.0 overall grade-point average at the undergraduate level.

Financial Aid

In general, students requesting financial support should have all credentials forwarded by February 1. For additional information write to the Director of Graduate Studies, Department of Pharmacology and Toxicology, WVU Health Sciences Center, Morgantown, WV 26506.

Master of Science

Ordinarily the department does not accept graduate students solely into a master's program. However, the master's degree is offered and is available as an intermediate degree en route to the Ph.D. Its primary function, as viewed by the faculty, is as an aid to the student new to research for the formulation, conduct, and writing of an abbreviated, but complete, independent research project. Most students, with the faculty's concurrence, choose to proceed directly with their doctoral research without a master's degree.

Doctor of Philosophy

Before official admission to candidacy for the doctorate, the student must satisfactorily complete a grant-writing exercise, an acceptable progress report, and an oral comprehensive qualifying examination.

Doctoral Committee/Examinations A doctoral examining committee will be formed at the time of submission of the grant proposal (at the beginning of the third year in the program). The committee will generally consist of at least three members from within the

Department of Pharmacology and Toxicology and two from outside the department. Before any doctoral committee is appointed, its membership must be approved by the department's faculty. The committee will then meet with the student to approve the grant-writing exercise and to discuss the details of the proposed dissertation research. Regardless of whether the student takes an M.S. or elects to do a progress report, he/she and the committee must agree on the final plan for the dissertation research. The committee is to be informed if major changes in the plan are contemplated and will meet periodically with the student to discuss his/her progress. Three or four months before the completion of the research project, the committee will again meet with the student to decide specific details of the dissertation preparation.

The oral preliminary examination will be held in early January of the student's third year in the program. The scheduling of the preliminary examination is contingent upon successful completion of all work to that date, including a satisfactory grant application. The student's doctoral committee will constitute the oral examining body.

If the student successfully passes the oral examination, a progress report should be submitted to his/her dissertation committee on or about March 1 of the third year.

If a student is not successful in the oral preliminary examination, the committee may recommend a second attempt to take place not less than one nor more than three months later. Alternatively, the committee may recommend to the entire faculty that the student should write a master's thesis.

Progress Report A progress report is expected to be written by each student in the program, except those students who are receiving an M.S. degree. M.S. students will write a master's thesis. The progress report should be written in the style of a dissertation and should be presented in an acceptable form to the dissertation committee on or about March 1 of the student's third year in the program. The student will defend the progress report before the dissertation committee.

Dissertation Upon admission to candidacy for the degree of doctor of philosophy, the candidate must select a topic for the dissertation under the direction of the candidate's advisor, complete a dissertation which makes a contribution to knowledge in the candidate's area of concentration, and pass an oral examination based primarily upon the dissertation. After successful completion of the oral examination and submission of the final copy of the dissertation, the candidate will be recommended for the degree.

Research Areas

Autonomic pharmacology: autonomic regulation of the cardiovascular system and of smooth muscle; sensitivity to autonomic drugs; electrophysiological studies of cardiac and smooth muscle.

Chemotherapy: antimalarial agents, anticancer agents, effects of pharmacological agents on single-cell organisms.

Biochemical pharmacology: drug metabolism, effects of drugs on lipid and nucleic acid metabolism, metabolism of environmental substances to carcinogens.

Molecular pharmacology: interaction of drugs and hormones with nucleic acids, molecular mechanisms of signal transduction.

Cellular pharmacology: mechanism of interaction of receptors with second messenger systems, function of ion channels.

Endocrine pharmacology: mechanism of action of steroids, metabolism of sex accessory tissues, relationship of hormones to tumor growth and development.

Neuropharmacology: biochemical basis of epilepsy, mechanism of action of anticonvulsant drugs, neuromediators in the central nervous system, electrophysiology of neurons.

Toxicology: metabolism of toxic agents, pulmonary toxicology, renal toxicology, environmental toxicology, and perinatal pharmacology and toxicology.

Pharmacology and Toxicology (PCOL)

243. *Pharmacology for Pharmacy Students*. I. 4 hr. PR: Completion of first year in Pharmacy; approval of course director. Principles, pharmacodynamic actions, and therapeutic applications of clinically useful drugs.

360. *Pharmacology and Therapeutics*. (For dental and graduate students.) I. 4 hr. PR: Dental student standing or consent. Lecture and demonstrations on pharmacological actions and therapeutic uses of drugs.

361. *Pharmacology*. (For medical students and a limited number of regular, full-time graduate students in basic medical science departments.) II. 1-6 hr. PR: Consent of department chairperson. Lecture-conference-laboratory on principles, pharmacodynamic actions, and therapeutic applications of clinically useful drugs.

362. *Occupational Toxicology*. II. 3 hr. PR: Consent. General principles of toxicology with special emphasis on occupational health. Classes of chemicals which pose problems in the workplace will be emphasized.

364. *Advanced Pharmacology*. I. (Alternate Years.) 1-6 hr. PR: PCOL 361 or consent. Advanced lectures and discussion of general principles of pharmacology and toxicology and advanced lectures in biochemical, endocrine, pulmonary, and cardiovascular pharmacology. 1-6 hr. lec. (Offered every second year.)

367. *Advanced Neuropharmacology*. I. 1-6 hr. PR: PCOL 361 or consent. Advanced lectures and discussion on drug receptor theory, neurophysiological aspects of pharmacology, supersensitivity, and the actions of drugs on the central and peripheral nervous system. 1-6 hr. lec. (Offered every second year.)

461. *Seminar in Pharmacology*. I, II. 1 hr. per sem. PR: PCOL 361 or graduate status in basic medical sciences.

462. *Literature Survey*. I, II. 1 hr. per sem. PR: Graduate status in pharmacology and toxicology. Current literature pertinent to pharmacology and toxicology including journals of allied biological sciences.

490. *Teaching Practicum*. I, II. 1-3 hr. per sem. PR: PCOL 361 and consent. (For advanced graduate students.) Critical evaluation of preparation and delivery of lectures in specified areas of pharmacology and toxicology.

491. *Advanced Study*. I, II. 1-6 hr. PR: Consent of chairperson.

497. *Research*. I, II, S. 1-15 hr. per sem.

Physiology

David Kreulen, Chairperson of the Department

Matthew Boegehold, Graduate Coordinator

3051 Health Sciences North

Degrees Offered: Master of Science, Doctor of Philosophy

The doctor of philosophy program is designed to produce physiologists of high quality, capable of conducting independent research and being effective teachers. Students are exposed to all aspects of physiology and a variety of related sciences. Our graduates, as a result of this rigorous training, may pursue careers in any area of physiology and can interact creatively with scientists in related fields. The master's program an introduction to research in physiology for students interested in, but not yet committed to, a research career. Students in this program receive training in the fundamentals of physiology and experience in a research laboratory.

Admission Requirements

Applicants should have a strong background in biology and/or chemistry. In addition to a basic biology course, it is strongly recommended that applicants have taken cellular or molecular biology and an introductory physiology course; a course on comparative anatomy also provides particularly useful background information. Inorganic and organic chemistry are basic requirements, while physical chemistry is recommended, but not required. As several areas of physiology require an understanding of the fundamentals of calculus and physics, introductory courses on these subjects are also essential.

The department requires the following materials for consideration for the M.S. or Ph.D. program: three letters of recommendation; transcripts of all undergraduate and graduate grades; a completed departmental application form; and Graduate Record Examination scores (aptitude only). Students from non-English speaking countries also need to pass the Test of English as a Foreign Language (TOEFL). The minimum acceptable score is 550. A bachelor's degree or equivalent is required for admission; a M.S. degree is not a prerequisite for the Ph.D. program.

A complete application kit and detailed descriptions of the degree programs can be obtained by writing to the Graduate Coordinator, Department of Physiology, Robert C. Byrd HSC of WVU, P.O. Box 9229, Morgantown, WV 26505-9229. Although applications may be submitted as late as March 1 of the year of matriculation, applications must be received before February 1 to be considered for financial aid.

Master of Science

The first two semesters are devoted largely to course work in physiology (six hours of graduate physiology, six hours of advanced physiology, and eight hours of physiological methods). An additional course requirement is cellular and molecular biochemistry (four hours per semester). Students are also introduced to the research interests of the faculty through the graduate colloquium and the physiological methods course, which includes rotations in two or more faculty member laboratories. At the end of the second semester, students pick a thesis advisor and begin work in that laboratory during the summer. The second year is spent primarily on research for and writing of the master's thesis. Students are required to present a research seminar during the second year.

Doctor of Philosophy

The first year curriculum familiarizes students with the basic information and principles that form a background for advanced work in physiology. Much of the first year is devoted to graduate physiology, advanced physiology (six hours) and cellular and molecular biochemistry (four hours per semester). Beginning in the first semester and

continuing throughout each subsequent year, the student will also take graduate forum (one hour per semester), which, along with advanced physiology, emphasizes critical appraisal of the current research literature.

Faculty Research In addition to the above course work, students are introduced to the research interests of the physiology faculty in the first year through the graduate colloquium and laboratory rotations. The latter are designed to help students choose a dissertation advisor by exposing them to the experimental approaches and techniques used in different laboratories within the department.

During the first summer, students are expected to begin research projects in a departmental research laboratory of their choice. This allows a student to explore an area of research interest without a firm commitment to pursue a dissertation project in that laboratory.

During the second year, the student combines course work with the continuing development of research interests. A graduate advisor is selected during this year. Courses include: advanced physiology (six hours), graduate colloquium (two hours), graduate seminar (one hour), graduate forum (one hour), and a teaching practicum. Through the teaching practicum, the student begins to develop his/her teaching skills. The purposes of the graduate colloquium and seminar are twofold. First, they give students an opportunity to become informed of the latest scientific advances. Second, students have an opportunity to develop and practice presentation of research seminars. In addition to presentations by faculty and students from the Department of Physiology, faculty members from other departments at WVU and from other institutions are invited to present seminars in the program.

Qualifying Examination After successful completion of the second academic year, the students take a two-part qualifying examination. The exam consists of a comprehensive written examination covering all of the major areas of physiology, followed by a written and oral research design examination. Upon successful completion of the qualifying examination, the student is admitted to candidacy for the degree of doctor of philosophy.

Teaching During the third and fourth years the student may enroll in elective courses. Yearly participation in the teaching practicum provides additional experience in delivering lectures to undergraduate and professional students. However, the student's major effort is directed toward dissertation research. Results of this effort are presented annually in the graduate colloquium. During these years the student will attend and present papers at national meetings of scientific societies (e.g., American Physiological Society, Biophysical Society, Endocrine Society, Experimental Biology, Society for Neurosciences). The Ph.D. degree generally can be completed in four to five years.

Faculty laboratories offer opportunities for research in cardiovascular, cell, endocrine, gastrointestinal, muscle, neural, renal, and respiratory physiology.

Physiology (PSIO)

241. *Mechanisms of Body Function*. I. 4 hr. PR: College chemistry, biology, physics, and algebra or graduate status and consent. A systematic examination of the homeostatic functions of the human body with emphasis on the physicochemical mechanisms involved. Pathophysiology and clinical correlations are introduced in relation to normal physiology.

341. *Physiological Methods 1*. II. 1-5 hr. PR: Consent. Research techniques and strategies for physiology.

342. *Physiological Methods 2*. I. 1-4 hr. PR: Consent. Research techniques and strategies for physiology.

343. *Fundamentals of Physiology*. (For dental students and a limited number of regular full-time graduate students in health sciences basic sciences departments.) I. 5 hr. PR: College physics, algebra, chemistry, and consent of department chairperson. Analysis of basic facts and concepts relating to cellular processes, organ systems, and their control. 3 lec., 1 conf., 1 lab.

344. *Medical Physiology 1*. (For medical and a limited number of regular full-time graduate students in health sciences basic sciences departments.) I. 5 hr. PR: College physics, algebra, chemistry, and consent of department chairperson. Analysis of basic facts and concepts relating to cellular processes, organ systems, and their control, with clinical correlations. 5 lec., 1 conf.- lab.

344. *Medical Physiology 2*. (For medical and a limited number of regular full-time graduate students in health sciences basic sciences departments.) II. 5 hr. PR: PSIO 344 and consent of department chairperson. Continuation of PSIO 344. 5 lec., 1 conf.- lab.

346. *Neurophysiology*. (For graduate students in health sciences basic sciences departments and a limited number of regular full-time graduate students.) II. 1-4 hr. PR: MATH 3 or 141, PSIO 1 and 2 or consent of department chairperson. Properties of excitable tissues (nerve and muscle), synaptic transmission, reflexes and central nervous system function, and behavior. 1-3 lec., 1 conf.

350. *Graduate Physiology 1*. (For graduate students in health sciences basic sciences departments and a limited number of other regular full-time graduate students.) I. 6 hr. PR: Calculus, college physics, organic chemistry, biology, and consent of department chairperson. Analysis of basic facts and concepts relating to cellular processes, organic systems, and their control.

350. *Graduate Physiology 2*. (For graduate students in the health sciences basic sciences departments and a limited number of other regular full-time graduate students.) II. 6 hr. PR: PSIO 344 or 350 and consent of department chairperson. Continuation of PSIO 350.

397. *Thesis*. I, II, S. 2-4 hr. PR: Consent. (Graded S or U.)

399. *Special Topics*. I, II, S. 1-4 hr. PR: Consent. Assigned study designed to develop research skills.

444. *Graduate Seminar*. I, II. 2 hr. PR: Graduate standing and consent. (Graded S or U.)

490. *Teaching Practicum*. I, II. 1-3 hr. PR: Consent. Supervised practices in college teaching of physiology. (Graded S or U.)

491. *Advanced Physiology*. I, II, S. 1-15 hr. PR: Consent. Lecture-conference in: cellular physiology, neurophysiology, circulation, respiration, acid-base and renal physiology, digestion and energy metabolism, and endocrinology. 3 lec., 3 conf.

497. *Research in Physiology*. I, II, S. 1-15 hr.

499. *Graduate Colloquium*. I, II. 1 hr. PR: Consent. (Graded S or U.)

Public Health

Institute of Occupational and Environmental Health

John Pearson, Chairperson of the Department

Alan Ducatman, Graduate Program Coordinator, Director, Occupational and Environmental Medicine, Residency Program

Degree Offered: Master's in Public Health

The M.P.H. program is currently structured to meet the needs of physicians preparing for a career in occupational and environmental medicine or related public health fields. Students learn how to identify and analyze determinants of health in large industrial or community populations with biostatistical and epidemiological methods. Students are instructed in research methods and in methods for effecting and evaluating changes in the health of the target populations through complex multidisciplinary collaboration and interaction with representatives from industry, government, labor, and other organizations.

As the nation moves to reform its health care system, public health considerations will shape future health care policy. The emerging system will be driven by the needs of the collective national population rather than by the desires of individual health care consumers or providers. A multidisciplinary effort will be required to develop and manage a system that ensures universal access and appropriate care on a limited budget. This critical approach to population-based health care defines the essence of public health. Health care workers of all kinds (health care providers, educators, legal experts, system experts, financial managers, and others) will need training in biostatistics, epidemiology, and other areas of public health practice to function effectively in the future.

Objectives

- Increase the number of active public health trained professionals.
- Enhance the effectiveness of health care workers to respond to the public health needs of the population they serve.
- Encourage research in public health that could ultimately benefit a given community and further the science.
- Provide training in fundamental public health skills: epidemiology, biostatistics, occupational health, and environmental health.
- Improve workplace and environmental health in this region.
- Completion of an accredited medical school
- Evidence of scholastic and clinical achievement (such as a minimum GPA of 3.0).

The documentation required for an application for admission include the following:

- Medical school diploma.
- Medical school transcripts.
- Three letters of recommendation.
- Current curriculum vitae.

These documents should be forwarded to Alan M. Ducatman, M.D., WVU School of Medicine, P.O. Box 9190, Morgantown, WV 26506-9190

Performance Standards

Students are expected to maintain a 3.0 GPA. A faculty review is required if two grades of C or less are recorded. Three grades of C or lower will result in academic suspension. Grades lower than C will not count toward satisfying graduate degree requirements.

Students should petition for admission to candidacy for the degree by filing a plan of study based upon selected research areas approved by faculty advisors.

Students must pass a comprehensive oral examination administered by the advisory committee.

Program Requirements

Program requirements include completion of 32 semester hours. Five hours at a minimum are applied to a research project; 27 hours are taken in epidemiology, biostatistics, environmental health, occupational health, public health organization, and behavioral health.

Required Courses

CMED 491 <i>Advanced Study: Biostatistics</i>	4 hr.
CMED 491 <i>Advanced Study: Public Health Epidemiology</i>	3 hr.
CMED 491 <i>Advanced Study: Environmental Health</i>	3 hr.
PUBA 491 <i>Advanced Study: Health Care Administration</i>	4 hr.
SOCA 233 <i>Sociology of Work and Work Places</i>	3 hr.
CMED 397 <i>Master's Degree Research or Thesis</i>	5 hr.

Recommended Electives

CCMD 350 <i>Radiation Safety and Isotope Use</i>	1 hr.
BE 349 <i>Management Seminar</i>	3 hr.
LAW 380 <i>Legal Research</i>	1 hr.
IE 260 <i>Human Factors Engineering</i>	3 hr.
IE 364 <i>Industrial Ergonomics</i>	3 hr.
PCOL 362 <i>Occupational Toxicology</i>	1 hr.

Community Medicine (CMED)

311. *Methods of Biostatistics*. I. 3 hr. PR: MATH 3. Basic concepts of statistical models, distributions, probability, random variables, test of hypotheses, confidence intervals, regression, correlation, F and X^2 distributions, analysis of variance with emphasis on methods of biostatistics. (Equiv. to STAT 311.)

312. *Community Medicine*. (Second Year.) II. 2 hr. PR: Consent. The role of the physician in the prevention of disease and in the examination of health status in a community, with reference to demographic, economic, sociologic, environmental, and occupational factors. The organization of public health and medical care.

322. *Epidemiology and Biostatistics*. (First Year.) II. 2 hr. PR: Consent; medical students only. Epidemiological and statistical analysis of biologic phenomena as related to medicine. Emphasis on descriptive statistics, analytical epidemiology, statistical inference, measures of association, and evaluation of medical literature.

391. *Advanced Topics*. 1-6 hr. PR: Consent.

397. *Master's Degree Research or Thesis*. 1-15 hr. PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project.

399. *Critical Review of Literature*. I & II. 1 hr. PR: MD or Consent. A review of current literature in occupational and environmental medicine, focused on analysis of validity and procedures followed; scrutiny of research reports, their design, methodology, data handling, documentation, and discussion of the data base. 1 hr. conf.

401. *Law and the Workplace*. Sl. 1 hr. PR: MD degree, graduate standing, or consent. Philosophy, content, and procedures of current judicial bodies relevant to the practice of medicine in the industrial society, developed through a series of lectures followed by extensive discussion involving students from different curricular backgrounds. 1 hr. sem.

412. *Medical Aspects of Environmental Health*. I & II. 1 hr. PR: MD degree or consent. A review of issues illustrating the responsibilities and professional interaction of physicians in identifying, managing, and preventing casualties from environmental causes in air, water, soil, food, pesticides, and related subjects. 1 hr. lec.

490. *Teaching Practicum I and II*. 1-3 hr. Consent of chairperson. Supervised practice in college teaching of anatomy. Graded S or U.

491. *Advanced Study*. I, II. 1-6 hr. PR: Consent of chairperson.

492. *Directed Study*. I, II, S. 1-6 hr. Directed study, readings, and research.

493. *Special Topics*. I, II, S. 1-6 hr. A study of contemporary topics selected from recent developments in the field.

494. *Special Seminars*. I, II, S. Special seminars arranged for advanced graduate students.

495. *Independent Study*. I, II, S. 1-6 hr. Faculty supervised study of topics not available through regular course offerings.

496. *Graduate Seminar*. 1 hr. PR: Consent. It is anticipated that each graduate student will present at least one seminar to the assembled faculty and graduate student body of his/her program. (Graded S/U)

498. *Thesis*. 2-4 hr. PR: Consent.

499. *Graduate Colloquium*. 1-6 hr. PR: Consent. For graduate students not seeking course work but who wish to meet residence requirements, use University facilities, and participate in academic and cultural programs.

School of Nursing

E. Jane Martin, Ph.D., R.N., F.A.A.N., Dean.

Joan E. Watson, Ph.D., R.N., F.A.A.N., Associate Dean for Research and Graduate Education.

Karen E. Miles, Ed.D., R.N., Associate Dean for Undergraduate Education

Michelle Janney, Ph.D., R.N., Associate Dean for HSC Clinical Services

Jacqueline W. Riley, M.N., R.N., Assistant Dean for Student Affairs

Mona M. Counts, Ph.D., R.N., Chairperson, Department of Health Promotion/Risk Reduction

Lynne Ostrow, Ed.D., R.N., Chairperson, Department of Health Restoration

Patricia S. Simoni, Ed.D., R.N., Chairperson, Department of Health Systems

Mary Jo Butler, Ed.D., R.N., Director, Charleston Division

Jacqueline Stemple, Ed.D., R.N., Director, Program Evaluation

Judith Kandzari, Ed.D., R.N., Director, Distance Education

The School of Nursing, one of the four professional schools housed at the Health Sciences Center, offers undergraduate and graduate programs of study leading to the B.S.N. and M.S.N. degrees and post master's nurse practitioner certification. The programs are offered in Morgantown and via satellite television and other advanced telecommunications systems to selected extension sites. The B.S.N. degree program is also available through a consortium with Glenville State College wherein students complete the lower division portion of the program on the GSC campus and the upper division credit hours are earned at the Charleston campus. Similarly, students may complete the lower division on the Potomac State College campus and the upper division at the Morgantown or Charleston campus.

The West Virginia University School of Nursing offers a program of study leading to the Master of Science in Nursing (M.S.N.) degree in rural primary health care with preparation in advanced practice nursing, nursing administration, or nursing education. The emphasis of advanced practice is on the vulnerable family population with specialization in child health, adult/elder health, women's health, or family health. Sub-specialties are potentially available. Also offered is a post graduate program of study which prepares master's level nurses as nurse practitioners. The master of science in nursing (MSN) degree is granted by West Virginia University to those who complete the 44-47 credit hour program. The post graduate nurse practitioner certificate is granted to those who complete the required 19 credit hours. The M.S.N. program has as its purpose the preparation of professional nurses who contribute to nursing science and assume advanced roles in the delivery of health care. The program provides the foundation for post master's study. Upon completion of the program the graduate is expected to:

- Practice nursing based on the conceptual model of the health of human systems dynamically interacting with the environment.
- Synthesize theory, practice, and research in developing the professional role of advanced nursing practice.
- Demonstrate accountability for health maintenance and promotion to self, the discipline, and society.
- Utilize systematic inquiry to guide decision-making related to critical issues impacting clients, the profession, and society.

Accreditation

The program is accredited by the National League for Nursing.

For further information write: Assistant Dean Student Affairs, WVU School of Nursing, RCB Health Sciences Center, PO Box 9600, Morgantown, WV 26506-9600.

Faculty

† Indicates regular graduate faculty.

* Indicates associate graduate faculty.

June C. Abbey, Ph.D., R.N. (U. Cal.-Berkeley). Adjunct Professor.
Shauna Aurelio, M.S.N., R.N. (WVU). Adjunct Instructor.
*Laurie Badzek, M.S., J.D., L.L.M., R.N. (WVU). Assistant Professor.
Barbara Banonis, M.S.N., R.N. (WVU). Adjunct Instructor.
Lucy Jackson Bayles, Ph.D., R.N. (Ball St.). Adjunct Associate Professor.
Maribeth Beckner, M.S.N., R.N., C.N.O.R. (WVU). Adjunct Instructor.
Rosemary Belden, M.S.N., R.N. (U. Va). Adjunct Instructor.
Marjorie Bower, Ed.D., R.N. (WVU). Visiting Assistant Professor.
*Caroline E. Brown, D.Ed., R.N.-C. (Penn. St. U.) Assistant Professor.
†Margaret Burkhardt, Ph.D., R.N. (U. Miami). Associate Professor.
Mary Jo Butler, Ed.D., R.N. (WVU). Director, Charleston Division and Associate Professor.
Victoria Casey, M.S.N., J.D., R.N. (WVU). Lecturer.
Ann Cleveland, M.S.N., R.N. (U. Va.). Visiting Instructor.
Jill Cochran, M.S.N., R.N. (WVU). Visiting Instructor, Kellogg Field Professor.
Susan Collins, M.S.N., R.N. (Duke U.). Adjunct Instructor.
Sandra Cotton, M.S.N., C.R.N.P. (U. of Md.) Visiting Instructor.
†Mona Counts, Ph.D., R.N.-C., F.A.N.P. (U. Tx.-Austin). Professor and Chair, Health Promotion/Risk Reduction Department.
Theresa Cowan, M.N., R.N. (WVU) Visiting Instructor and Coordinator, GSC/WVU Joint Nursing Program.
Joan Danner, M.S., R.N., C.S. (U. of Md.). Adjunct Instructor.
Brenda Daugherty, M.S.N., R.N., N.N.P. (WVU) Adjunct Instructor.
Daniel DeFeo, M.S.N., R.N., C.C.R.N., F.N.P. (WVU). Visiting Instructor.
†Pamela Deiriggi, Ph.D., R.N. (U. Tx.-Austin). Associate Professor.
Kimberly B. Demchak, M.S.N., R.N. (WVU). Visiting Instructor.
Patricia A. Diehl, M.A., R.N. (WVU). Associate Professor.
Rose Ann DiMaria, M.S.N., R.N., C.N.S.N. (Hunter-Bellevue Sch. of Nursing) Lecturer.
Shelia Dunn, M.S.N., R.N. (WVU) Visiting Instructor.
Mary F. Fanning, M.S.N., R.N.-C., C.C.R.N. (WVU) Adjunct Instructor.
Imogene Foster, Ed.D., R.N. (WVU). Associate Professor.
C. Anne Gagnon, M.P.H., R.N. (U. Pitt.) Visiting Assistant Professor.
Mary Gibson, M.S.N., R.N., C.N.M. (Yale U.). Adjunct Instructor.
Nancy I. Greenstreet, M.S.N., R.N. (WVU). Adjunct Instructor.
Suzanne W. Gross, Ph.D., R.N. (U. Tx.-Austin) Assistant Professor.
Mary Pat Gruber, M.S.N., R.N. (WVU) Adjunct Instructor.
Patricia Harman, M.S.N., R.N., C.N.M. (U. of Minn.) Adjunct Instructor.
*Debra Harr, Ed.D., R.N. (WVU). Associate Professor.
Elizabeth Kerr Hay, M.S.N., R.N. (Vanderbilt U.). Adjunct Associate Professor.
Tracy A. Hessami, M.S.N., R.N., C.N.M. (Yale U.). Adjunct Instructor.
Cheryl A. Hettman, M.S.N., R.N., C.C.R.N. (WVU) Assistant Professor.
Diana Higginbotham, M.S., R.N. (WVU) Adjunct Instructor.
Jean M. Hoff, M.P.H., R.N. (U. Pitt.). Associate Professor Emerita.
Patricia Horstman, M.S.N., R.N. (WVU). Adjunct Instructor.
Elizabeth Hupp, M.S.N., R.N. (WVU). Adjunct Instructor.
Jodie Jackson, M.P.H., R.N. (Johns Hopkins U.) Adjunct Instructor.
Lorita D. Jenab, Ed.D., R.N. (Columbia U.). Dean Emerita.
*Dorothy M. Johnson, Ed.D., R.N. (WVU). Assistant Professor.
Linda Joyce Justice, M.S.N., R.N. (WVU). Adjunct Instructor.
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Grace J. Kreulen, Ph.D., R.N. (U. of Az.) Adjunct Instructor.
*Barbara Kupchak, Ph.D., R.N. (U. Tx.-Austin). Associate Professor.
Susan Leight, Ed.D., R.N. (WVU). Lecturer.

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 *Deborah Lewis, Ed.D., R.N.-C.S., C.D.E. (WVU). Assistant Professor.
 Sandra Marra, M.S.N., R.N. (WVU). Lecturer.
 Kathleen Marsland, M.S., R.N. (U. Colo.). Assistant Professor.
 †E. Jane Martin, Ph.D., R.N., F.A.A.N. (U. Pitt.) Professor and Dean.
 Deborah Maust, M.S.N., R.N. (WVU). Adjunct Instructor.
 Gaynelle McKinney, M.S.N.Ed., R.N., F.A.A.N. (Ind. U.). Professor Emerita.
 †Karen Miles, Ed.D., R.N. (WVU). Associate Professor & Associate Dean for Undergraduate Education.
 Lois C. Miracle, M.S.N., R.N., A.N.P. (U. Akron). Visiting Instructor, Kellogg Field Professor.
 *Marsha Mitchell, Ed.D., R.N. (WVU). Assistant Professor.
 Elaine Champion Nailler, M.S.N., R.N., C.S. (Wayne St. U.) Director of Faculty Practice Plan.
 Cyndy Napoletano, M.S.N., R.N., C.C.R.N. (WVU). Adjunct Instructor.
 Alvita Nathaniel, M.S.N., R.N. (WVU). Lecturer.
 Mary Nemeth-Pyles, M.S.N., R.N. (WVU). Lecturer.
 Charlotte Nath, Ed.D., R.N., C.D.E. (WVU) Adjunct Assistant Professor.
 Susan Newfield, Ph.D., R.N. (Tx. Tech. U.), Assistant Professor.
 Barbara Nunley, M.S.N., R.N. (Ohio St. U.). Instructor.
 Lois O'Kelley, M.S.N., R.N. (Wayne St. U.), Associate Professor Emerita.
 Terina Oman, M.S.N., R.N. (WVU) Adjunct Instructor.
 †Lynne Ostrow, Ed.D., R.N. (WVU). Associate Professor and Chair, Health Restoration Department.
 Mary Ellen Pauley, M.S.N., R.N. (WVU). Lecturer.
 †Cynthia Armstrong Persily, Ph.D., R.N. (U. of Penn.). Assistant Professor.
 Vincent Pieranungi, Ph.D., R.N. (U. of Tx.-Austin). Associate Professor.
 Drema Pieson, M.S.N., R.N., C.N.A.. (Bellarmine College). Adjunct Instructor.
 Judith Polak, M.S.N., R.N., N.N.P. (U. of Fla.) Adjunct Instructor.
 *Marcia Pollard, J.D., M.S.N., R.N. (WVU). Assistant Professor (LOA).
 Joan Probst, Ed.D., R.N.-C.S. (WVU) Adjunct Associate Professor.
 †Beverly C. Richert, Ph.D., R.N. (U. Pitt.) Lecturer.
 Jacqueline Riley, M.N., R.N. (U. Fla.). Associate Professor and Assistant Dean for Student Affairs.
 Susan Ritchie, M.P.H., R.N. (UNC). Adjunct Instructor.
 Bonnie Roche, M.S.N., R.N.-C. C.R.N.N. (WVU) Adjunct Instructor.
 Sherry L. Rockwell, M.S.N., R.N., C.C.R.N., E.M.T.-P. (U. Pitt.) Adjunct Instructor.
 Kari Sand-Jacklin, M.S., R.N. (U. of Ill.). Clinical Instructor.
 Joanne Seasholtz, Ph.D., R.N. (U. Pitt). Adjunct Assistant Professor.
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 †Mary Jane Smith, Ph.D., R.N. (NYU). Professor.
 Loreto C. Sobong, Ph.D. (NYU), Research Associate.
 Mary Kaye Staggars, M.S.N., R.N. (Wayne St.). Visiting Instructor and Coordinator, Potomac State College.
 Jacqueline Stemple, Ed.D., R.N. (WVU). Associate Professor and Director of Evaluation.
 Fredona Stenger, M.S.N., R.N. (Boston U.). Associate Professor.
 Martha Summers, M.S.N., R.N. (WVU), Lecturer.
 Sally M. Taylor, Ed.D., R.N. (WVU), Adjunct Assistant Professor.
 Debra Thompson, M.S.N., R.N. (U. Pitt.). Adjunct Instructor.
 Nancy Traubert, M.S.N., R.N. (Ohio St.). Adjunct Instructor.
 Lucille Ullman, M.S., R.N. (UCLA) Lecturer.
 †Janet Wang, Ph.D., R.N., F.A.A.N. (U. Pitt.). Associate Professor.
 Susan J. Watkins, M.S.N., R.N. (WVU) Adjunct Instructor.
 †Joan E. Watson, Ph.D., R.N., F.A.A.N. (Ohio St.). Professor and Associate Dean for Research and Graduate Education.
 *Lynne Welch, Ed.D., R.N. (Columbia U.). Adjunct Professor and Dean, Marshall University School of Nursing.
 Julia Z. White, M.S.N., R.N. (WVU) Adjunct Instructor.
 Alison Witte, M.S., R.N. (U. Md.). Lecturer.
 Jerry H. Yohok, M.S.N., R.N., C.N.A.A. (WVU) Adjunct Instructor.
 Alice Ziomek, M.S.N., R.N. (WVU). Visiting Instructor.

Master of Science in Nursing

The graduate program prepares advanced practice nurses in the specialties of adult/elder health, child health, women's health or family health, administration, and education. The curriculum model allows students to enroll on a part-time or full-time basis. Throughout the curriculum, students are guided in self-development aimed at pursuing excellence in scholarly and professional endeavors. The program allows flexibility within the basic curricular structure through the individualization of learning experiences, electives, master's paper, thesis, and the opportunity to investigate an area of interest in advanced study.

Study Plan The pattern and duration of the student's study plan is determined in consultation with a faculty advisor and is based upon the student's background and goals. The program can be completed in five semesters of full-time study at the Morgantown campus. The average full-time load is 9-12 credit hours per semester.

Graduate education in nursing prepares advanced practice nurses, administrators, and educators capable of leadership in developing and expanding nursing knowledge, skills, and practice competencies in light of societal needs. The master's graduate is able to provide quality health care in a variety of settings while clarifying and redefining nursing roles.

Admission Requirements Applicants for the master's program in nursing must meet WVU admission requirements for graduate education. For full admission to the nursing program they must have a cumulative GPA of 3.0 or higher on a 4.0 scale on all college work attempted; have completed a baccalaureate program in nursing which is accredited by the National League for Nursing (NLN); have completed a course in health assessment; have a total GRE score of 1250 or higher within the last five years with minimum scores of 400 on the verbal and analytical scales and 350 on the quantitative scale; possess a current, unrestricted RN license; have completed three credits of statistics acceptable for transfer with a grade of C or better; have completed a health assessment course which included physical examination skills and is acceptable for transfer with a grade of C or better.

The BSN degree is mandatory. Applicants who do not meet one or more of the other criteria above may be considered for provisional admission on an individual basis. Preference is given to West Virginia residents.

M.S.N. Degree Requirements

- Completion of 44 or 47 semester credit hours, including 34 hours in nursing and seven hours of cognates specific to the area of concentration.
- Completion of a master's paper (three hours) or thesis (six hours).
- Successfully complete a comprehensive examination.
- Achievement of an overall academic average of at least B in all work attempted in the master's program. The grade C in two nursing courses will require a faculty review of the student's program progression.
- Removal of all conditions, deficiencies, and incomplete grades. Credit hours for courses in which the grade is lower than C will not count toward satisfying graduate degree requirements.

Required courses must be taken for letter grades (A, B, C). Electives may be opted for pass (P) or fail (F) grades, subject to the approval of the advisor.

Post Graduate Nurse Practitioner Certificate Program

This program prepares nurses with an M.S.N. degree as nurse practitioners. The fields of specialization offered are the same as those available in the MSN curriculum. Those who complete the program of study are eligible to sit for the examination for national certification as a nurse practitioner.

Application Requirements To be considered for admission, the applicant must have a master's degree in nursing from an NLN accredited program with a minimum cumulative GPA of 3.0 or better and an unrestricted R.N. license in at least one state.

Certificate Program Requirements Each student's program will be individualized based on their educational and experiential background. Prerequisites to registration for the four required clinical courses are evidence of competence in advanced physiology/pathophysiology, applied therapeutics (pharmacology), and physical examination skills. Competence may be established by transfer of academic credit, enrollment in academic or CEU courses, or challenge examination. The four required courses for post master's certification as a nurse practitioner are: NSG 336 *Clinical Diagnosis across the Lifespan, the Speciality cognate, Speciality practicum I and Speciality practicum II*. In addition, the student must maintain a 3.0 GPA and satisfactory clinical ratings.

Deadlines

The application process for both the master's and post master's program must be completed by **March 1 for summer (May) enrollment; June 1 for fall enrollment and October 1 for spring enrollment**. Class sizes are limited, based on available faculty resources and space.

Application Process

Applicants need to complete the following steps to be considered for admission:

1. Complete two application forms as indicated and return to the appropriate offices to avoid unnecessary delay in the review process.

a. An application for Admission to Graduate Studies (available from Admissions and Records) must be returned with a nonrefundable service fee to: Office of Admissions and Records, West Virginia University, P.O. Box 6009, Morgantown, WV 26506-6009.

b. An application for Admission to the Master of Science in Nursing Program (available from School of Nursing Student Affairs Office) must be returned to: WVU School of Nursing, Student Affairs Office, PO BOX 9600, Morgantown, WV 26506-9600.

2. Request an official transcript of records from each college or university previously attended. Transcripts and records should be sent directly from the institution to the WVU Office of Admissions and Records, P.O. Box 6009, Morgantown, WV 26506-6009.

3. Send three recommendation letters directly to the Student Affairs Office, WVU School of Nursing, PO BOX 9600, Morgantown, WV 26506-9600.

Parameters used for the review of applicants include: test scores, academic achievement, professional experience, career goals, and recommendations. When admitted, the student is assigned a faculty advisor who guides the student in curricular and academic matters. Enrollment in nursing courses is based on readiness and availability of space.

M.S.N. Curriculum

M.S.N. Nursing Theory, Practice, and Research (37-40 hours)

NSG 322 Theory/Critical Analysis	3 hr.
NSG 324 Research, Evaluation, and Analysis	5 hr.
NSG 326 Health Policy, Issues, and Ethics	3 hr.

NSG 332 Concepts of Advanced Nursing	2 hr.
NSG 333 Family, Community, Rural Health Systems	2 hr.
NSG 336 Clinical Diagnosis Across the Life Span	3 hr.
NSG 340/50/60/70/80 Speciality Course	4 hr.
NSG 341/51/61/71/81 Speciality Practicum 1	6 hr.
NSG 342/52/62/72/82 Speciality Practicum 2	6 hr.
NSG 397 Research (master's paper-3 credits or Thesis - 6 credits)	3-6 hr.
Subtotal	37-40 hr.
Plus Speciality Requirements	7 hr.
Total	44-47 hr.

M.S.N. Suggested Full-Time Plan of Study

(Note: not all courses are available every semester.)

Practitioner	Educator	Administrator
Semester 1		
NSG 322 <i>Theory/Critical Analysis</i>	NSG 322 <i>Theory/Critical Analysis</i>	NSG 322 <i>Theory/Critical Analysis</i>
3 cr.	3 cr.	3 cr.
NSG 332 <i>Concepts of Advanced Nursing</i>	NSG 332 <i>Concepts of Advanced Nursing</i>	NSG 332 <i>Concepts of Advanced Nursing</i>
2 cr.	2 cr.	3 cr.
NSG 336 <i>Clinical Diagnosis Across the Lifespan</i>	NSG 336 <i>Clinical Diagnosis Across the Lifespan</i>	NSG 336 <i>Clinical Diagnosis Across the Lifespan</i>
3 cr.	3 cr.	3 cr.
PSIO 241 <i>Mechanisms of Body Function</i>	PSIO 241 <i>Mechanisms of Body Function</i>	Administration Cognate ...
4 cr.	4 cr.	4 cr.
Total	Total	Total
12 cr.	12 cr.	12 cr.

Semester 2		
NSG 324 <i>Research, Evaluation, and Analysis</i>	NSG 324 <i>Research, Evaluation, and Analysis</i>	NSG 324 <i>Research, Evaluation, and Analysis</i>
5 cr.	5 cr.	5 cr.
NSG 326 <i>Health Policy</i> ..	NSG 326 <i>Health Policy</i> ..	NSG 326 <i>Health Policy</i> ...
3 cr.	3 cr.	3 cr.
NSG 333 <i>Family, Community, Rural Health Systems</i> ..	NSG 333 <i>Family Systems and Rural Health</i>	NSG 333 <i>Family Systems and Rural Health</i>
2 cr.	2 cr.	2 cr.
Total	Total	Total
10 cr.	10 cr.	10 cr.

Semester 3 (Summer session)		
Specialty Course	Specialty Course	Specialty Course
NSG 360 <i>Adult/Elder</i> , NSG 350 <i>Child Health</i> , NSG 380 <i>Family Health</i> , NSG 340 <i>Women's Health</i>	NSG 360 <i>Adult/Elder</i> , NSG 350 <i>Child Health</i> , NSG 380 <i>Family Health</i> , NSG 340 <i>Women's Health</i>	NSG 370 <i>Administration</i> ..
4 cr.	4 cr.	4 cr.
Pharmacology for Practitioners	Education Cognate	Administration Cognate ...
3 cr.	3 cr.	3 cr.
Total	Total	Total
7 cr.	7 cr.	7 cr.

Semester 4		
Practicum 1	Practicum 1	Practicum 1
NSG 361 <i>Adult/Elder</i> , NSG 351 <i>Child Health</i> , NSG 381 <i>Family Health</i> , NSG 341 <i>Women's Health</i> 6 cr.	NSG 361 <i>Adult/Elder</i> , NSG 351 <i>Child Health</i> , NSG 381 <i>Family Health</i> , NSG 341 <i>Women's Health</i> 6 cr.	NSG 371 <i>Administration</i> ..
6 cr.	6 cr.	6 cr.
Total	Total	Total
6 cr.	6 cr.	6 cr.

Semester 5**Practicum 2**

NSG 362 *Adult, Elder,*
 NSG 352 *Child Health,*
 NSG 382 *Family Health,*
 NSG 342 *Women's Health* 6 cr
 NSG 397 *Research -*

Practicum 2

NSG 375 *Teaching* 6 cr.
 NSG 397 *Research-*
 Paper Option 3 cr.
 OR
 Thesis Option 6 cr.

Practicum 2

NSG 372 *Administration* .. 6 cr.
 NSG 397 *Research-*
 Paper Option 3 cr.
 OR
 Thesis Option 6 cr.

Paper Option 3 cr.
 Or

Thesis Option 6 cr.

Total 9 or 12 cr.

*Total Credits 44 or 47 cr.

Total 9 or 12 cr.

Total 9 or 12 cr.

* Total credits will vary depending on the type of Research Project completed.

M.S.N. Suggested Part Time Plan of Study

(Note: not all courses are available every semester.)

Practitioner**Semester 1**

NSG 322 *Theory/Critical*
 Analysis 3 cr.
 PSIO 241 *Mechanisms of*
 Body Function 4 cr.
 Total 7 cr.

Educator

NSG 322 *Theory/Critical*
 Analysis 3 cr.
 PSIO 241 *Mechanisms of*
 Body Function 4 cr.
 Total 7 cr.

Administrator

NSG 322 *Theory/Critical*
 Analysis 3 cr.
 Administration Cognate ... 4 cr.
 Total 7 cr.

Semester 2

NSG 324 *Research, Evaluation,*
 and Analysis 5 cr.
 Total 5 cr.

NSG 324 *Research, Evaluation*
 and Analysis 5 cr.
 Total 5 cr.

NSG 324 *Research, Evaluation*
 and Analysis 5 cr.
 Total 5 cr.

Semester 3 (Summer session)

NSG 333 *Family, Community,*
 Rural Health Systems .. 2 cr.
 Total 2 cr.

NSG 333 *Family Systems and*
 Rural Health 2 cr.
 Total 2 cr.

NSG 333 *Family Systems and*
 Rural Health 2 cr.
 Total 2 cr.

Semester 4

NSG 332 *Concepts of*
 Advanced Nursing 2 cr.
 Total 2 cr.

NSG 332 *Concepts of*
 Advanced Nursing 2 cr.
 Total 2 cr.

NSG 332 *Concepts of*
 Advanced Nursing 2 cr.
 Total 2 cr.

Practitioner**Semester 5**

NSG 336 *Clinical Diagnosis*
 Across the Lifespan 3 cr.
 Total 3 cr.

Educator

NSG 336 *Clinical Diagnosis*
 Across the Lifespan 3 cr.
 Total 3 cr.

Administrator

NSG 336 *Clinical Diagnosis*
 Across the Lifespan 3 cr.
 Total 3 cr.

Semester 6 (Summer Session)

Specialty Course	Specialty Course	Specialty Course
NSG 360 <i>Adult/Elder</i> ,	NSG 360 <i>Adult/Elder</i> ,	NSG 370 <i>Administration</i> .. 4 cr.
NSG 350 <i>Child Health</i> ,	NSG 350 <i>Child Health</i> ,	Administration Cognate ... 3 cr.
NSG 380 <i>Family Health</i> ,	NSG 380 <i>Family Health</i> ,	
NSG 340 <i>Women's</i>	NSG 340 <i>Women's Health</i> 4 cr.	
<i>Health</i> 4 cr.	Education Cognate 3 cr.	
Pharmacology for		
Practitioners 3 cr.		
Total 7 cr.	Total 7 cr.	Total 7 cr.

Semester 7

Practicum 1	Practicum 1	Practicum 1
NSG 361 <i>Adult/Elder</i> ,	NSG 361 <i>Adult/Elder</i> ,	NSG 371 <i>Administration</i> .. 6 cr.
NSG 351 <i>Child Health</i> ,	NSG 351 <i>Child Health</i> ,	
NSG 381 <i>Family Health</i> ,	NSG 381 <i>Family Health</i> ,	
NSG 341 <i>Women's</i>	NSG 341 <i>Women's</i>	
<i>Health</i> 6 cr.	<i>Health</i> 6 cr.	
Total 6 cr.	Total 6 cr.	Total 6 cr.

Semester 8

Practicum 2	Practicum 2	Practicum 2
NSG 362 <i>Adult/Elder</i> ,	NSG 375 <i>Teaching</i> 6 cr.	NSG 372 <i>Administration</i> .. 6 cr.
NSG 352 <i>Child Health</i> ,		
NSG 382 <i>Family Health</i> ,		
NSG 342, <i>Women's</i>		
<i>Health</i> 6 cr.		
Total 6 cr.	Total 6 cr.	Total 6 cr.

Semester 9

NSG 326 <i>Health Policy</i> , . 3 cr.	NSG 326 <i>Health Policy</i> , ... 3 cr.	NSG 326 <i>Health Policy</i> , ... 3 cr.
NSG 397 <i>Research</i> –	NSG 397 <i>Research</i> –	NSG 397 <i>Research</i> –
Paper Option 3 cr.	Paper Option 3 cr.	Paper Option 3 cr.
OR	OR	OR
Thesis Option 6 cr.	Thesis Option 6 cr.	Thesis Option 6 cr.
Total 6 or 9 cr.	Total 6 or 9 cr.	Total 6 or 9 cr.

*Total Credits 44 or 47 cr. *Total Credits 44 or 47 cr. *Total Credits 44 or 47 cr.

* Total credits will vary depending on the type of Research Project completed.

Nursing (NSG)

322. *Theory and Critical Analysis*. I, S. 3 hr. Introduction to the theoretical foundations of the discipline of nursing as a basis for applying critical thinking skills to developing a conceptual framework for nursing.

324. *Research, Evaluation, and Analysis*. II, 5 hr. PR: NSG 322. An overview of research, measurement, and evaluation models useful to nursing practice.

326. *Health Policy, Issues and Ethics*. I, II, S. 3 hr. PR: NSG 322 or consent. A focus on the social, political, technological, ethical, and economical dynamics that shape health care delivery.

332. *Concepts of Advanced Nursing*. I, S. 2 hr. PR: NSG 322. Exploration and evaluation of theories and research in leadership, education, organization, and management concepts applicable in the advanced practice of nursing.

333. *Family, Community, Rural Health Systems*. I, II. 2 hr. PR: NSG 322. Exploration and analysis of theories and research on family, community and rural health systems applicable in the advanced practice of nursing.

336. *Clinical Diagnosis Across the Lifespan*. I, S. 3 hr. PR: NSG 322. Introduction to the knowledge and skills basic to the assessment of health status, diagnosis, treatment, and evaluation in the advanced practice of nursing.

340. *Specialty Course, Women's Health*. I. 4 hr. PR: NSG 336. Application of the theoretical foundations of advanced practice nursing in the care of women in rural settings; management of care for prevention, intervention, and evaluation.

341. *Women's Health Practicum 1*. II. 6 hr. PR: NSG 340. Implementation of theory-based nursing practice with women in rural community systems; student development of advanced practice role in managing, consulting, and caring for women.

342. *Women's Health Practicum 2*. S. 6 hr. PR: NSG 341. Supervised clinical experience under the direction of an advanced practice nurse faculty in the delivery of primary health care to women in rural areas.

350. *Specialty Course, Child Health*. 4 hr. PR: NSG 336. Application of the theoretical foundations of advanced practice nursing in child health; management of care for prevention, intervention, and evaluation.

351. *Child Health Practicum 1*. I, II. 6 hr. PR: NSG 350. Implementation of theory based nursing practice with children in rural community systems; student's development in the advanced practice role in managing, consulting, and caring for children.

352. *Child Health Practicum 2*. I, II. 6 hr. PR: NSG 351. Supervised clinical experience under the direction of an advanced practice nurse faculty in the delivery of primary health care to children in rural areas.

360. *Specialty Course, Adult-Elder Health*. I. 4 hr. PR: NSG 336. Application of the theoretical foundations of advanced practice nursing in the care of adult-elders in rural settings; Management of care for prevention, intervention, and evaluation.

361. *Adult/Elder Health Practicum 1*. I. 6 hr. PR: NSG 360. Implementation of theory-based advanced nursing practice with the adult/elder population; students develop the advanced practice role in managing, consulting, and caring for the adult/elder population in the community.

362. *Adult-Elder Practicum 2*. II. 6 hr. PR: NSG 361. Supervised clinical experience under the direction of an advanced practice nurse faculty in the delivery of primary health care to adult/elders in rural community settings.

370. *Specialty Course, Administration*. S. 4 hr. PR: NSG 336. Application of the theoretical foundations of nursing administration.

371. *Administration Practicum 1*. I. 6 hr. PR: NSG 370. Introduction to organizational theory in relation to the leadership role; concepts and methods used to facilitate and coordinate nursing services.

372. *Administration Practicum 2*. II. 6 hr. PR: NSG 371. Application of the integrative processes required by nurse executives to ensure health care system effectiveness.

375. *Education Practicum*. II. 6 hr. PR: NSG 336, Specialty cognate, and Specialty practicum in area of interest. Supervised practice in the application of theories and methods related to nursing education.

380. *Specialty Course, Rural Family Health*. I. 4 hr. PR: NSG 336. Application of the theoretical foundations of advanced practice nursing in rural family health care; management of care for prevention, intervention, and evaluation.

381. *Rural Family Health Practicum 1*. I. 6 hr. PR: NSG 380. Implementation of theory-based advanced nursing practice with individuals, families, and groups in the rural community systems; student development of the advanced practice role in managing, consulting, and caring for families.

382. *Rural Family Health Practicum 2*. II. 6 hr. PR: NSG 381. Supervised clinical experience under the direction of an advanced practice nurse faculty in the delivery of primary health care to individuals, families and groups in rural areas.

391. *Advanced Study*. I, II, S. 1-3 hr. PR: Graduate standing; consent. In depth study of topics related to current issues in nursing and primary health care. Study may be independent or through specially scheduled seminars.

397. *Research*. I, II, S. 1-15 hr. PR: NSG 373; PR or Conc: NSG 378. Refinement and implementation of research proposal to meet requirements for a master's paper.

491. *Advanced Study*. I, II, S. 1-3 hr. PR: Consent. Post master's standing.

497. *Research*. I, II, S. 1-15. PR: Consent. Post master's standing.

School of Pharmacy

George R. Spratto, Ph.D., Dean

Carl J. Malanga, Ph.D., Associate Dean for Academic Affairs

Joseph K. H. Ma, Ph.D., Interim Assistant Dean for Research and Graduate Programs

The WVU School of Pharmacy offers graduate programs in the pharmaceutical sciences for both the M.S. and Ph.D degrees. It is advantageously located in the Health Sciences Center complex which also houses all departments of the schools of Medicine, Nursing, and Dentistry, as well as a comprehensive medical library, audiovisual and computer-based learning center, photo-illustration service, and laboratory animal quarters. The School of Pharmacy maintains its own research laboratories and equipment on three floors within a section of the Health Sciences Center complex.

Applicants for the Ph.D. may choose among several specialty areas, which include medicinal chemistry, pharmaceutics, biopharmaceutics/pharmacokinetics, and behavioral/administrative pharmacy. Applicants for the M.S. may specialize in pharmacy administration, pharmacology and toxicology, pharmacognosy, pharmaceutical/medicinal chemistry, industrial pharmacy, pharmaceutics, and biopharmaceutics/pharmacokinetics. The pharmaceutical sciences uniquely encompass a wide variety of interrelated areas of science and technology. For example, students in medicinal chemistry are trained to combine knowledge in analytic/synthetic chemistry, biochemistry, pharmacology, pharmacokinetics, and toxicology in the design and synthesis of new drugs; those who specialize in pharmaceutics, biopharmaceutics, and pharmacokinetics are trained to combine physicochemical methods, cellular and molecular biology, and drug metabolism in the design and evaluation of novel drug delivery systems and their impact on pharmacodynamic and therapeutic effects; and those who specialize in behavioral/administrative pharmacy may integrate sociology, marketing, economics, health care policy administration, public health, etc., or may develop optimal methods in the delivery of pharmaceutical and health services.

Master of Science and Doctor of Philosophy

Students must possess a baccalaureate degree from a suitable academic discipline with an overall grade-point average of at least 2.75 and an aptitude and interest for graduate work in the pharmaceutical sciences. Furthermore, GRE scores in the verbal, quantitative, and analytical sections are required. TOEFL scores may be required of international students.

To obtain specific information related to the school's graduate programs, graduate faculty research interests, and availability of graduate assistantships or fellowships, applicants may write directly to: Assistant Dean for Research and Graduate Programs, WVU School of Pharmacy, Health Sciences Center North, P.O. Box 9500 Morgantown, WV 26506. Telephone: (304) 293-5211.

School of Pharmacy Graduate Programs

Pharmaceutical Sciences..... M.S., Ph.D.

Graduate Faculty in Pharmaceutical Sciences

* Indicates associate membership in the graduate faculty.

Professors

Marie A. Abate, Pharm.D. (U. Mich.). Drug information, Computer assisted instruction, Study design and evaluation.

*Calvin C. Brister, Ph.D. (U. Miss.). Biopharmacy.

*Stephen A. Howard, Ph.D. (U. Mich.). Adjunct. Pharmaceutics, Industrial pharmacy.

Arthur I. Jacknowitz, Pharm.D. (Phila. C. Pharm.). Drug information systems.
 David Lalka, Ph.D. (SUNY-Buffalo). Pharmacokinetics, Biochemical pharmacology.
 James K. Lim, Ph.D. (U. N.C.). Pharmaceutical product formulation studies, Fluorides and dental antiplaque agents, Semisolid rheology.
 Joseph H.K. Ma, Ph.D. (Duquesne U.). Pharmaceutics and pharmaceutical chemistry; molecular and cellular approaches to targeted drug delivery.
 Carl J. Malanga, Ph.D. (Fordham U.). Biopharmacy, Pharmacology and physiology of mucociliary transport.
 *Jay Nematollahi, Ph.D. (U. Calif.). Adjunct. Medicinal chemistry.
 *Frank D. O'Connell, Ph.D. (Purdue U.). *Emeritus*.
 *John P. O'Donnell, Ph.D. (U. Iowa). Adjunct. Medicinal chemistry.
 Charles D. Ponte, Pharm.D. (U. Utah). Women's health issues, Family medicine.
 David A. Riley, Ed.D. (U. Ga.). Continuing education, Behavioral and administrative pharmacy.
 Sidney A. Rosenbluth, Ph.D. (U. Tex.). Development and evaluation of expanded pharmacists' roles in health care delivery, Disease prevention/health promotion.
 George R. Spratto, Ph.D. (U. Minn.). Dean. Pharmacology.

Associate Professors

Peter M. Gannett, Ph.D. (U. Wisc.). Metabolism and carcinogenesis of alkyl hydrazines.
 Robert K. Griffith, Ph.D. (Ohio St. U.). Drug design, Medicinal chemistry.
 Sundareswaran (Suresh) Madhavan, Ph.D. (Purdue U.). Health care and pharmaceutical marketing, Health services research, Pharmaceutical cost-containment.
 Yongyut Rojanasakul, Ph.D. (U. Wisc.). Pharmaceutics, Drug delivery and transport phenomena in biological systems; antisense oligonucleotides.
 Mohamadi Sarkar, Ph.D. (MCV). Pharmaceutics.
 Paula Jo Meyer Stout, Ph.D. (WVU). Pharmaceutics, Industrial pharmacy/product formulation.

Assistant Professors

*Mary Castiglia, Pharm. D. (Med. U. SC). Infectious disease; Antimicrobial resistance.
 *Nahla Khoury, Ph.D. (WVU). Adjunct. Pharmaceutics.
 *Lynn LaCagnin, Ph.D. (WVU). Adjunct. Drug metabolism.
 *W. Greg Leader, Pharm. D. (U. Ky). Applied pharmacokinetics; extrahepatic metabolism; adult pulmonary medicine.
 *Patrick K. Noonan, Ph.D. (U.C.S.F.). Adjunct. Development and pharmacokinetic evaluation of oral and transdermal drug delivery systems.
 Folakemi Odedina, Ph.D. (U. FL). Social and behavioral aspects of the medication use process in patient care and pharmacy practice.
 Timothy Tracy, Ph.D. (Purdue U.). Clinical pharmacology; drug metabolism.

Pharmaceutical Sciences

Joseph K. H. Ma, Interim Assistant Dean for Research and Graduate Programs
 1136 Health Sciences North

Degrees Offered: Master of Science, Doctor of Philosophy

The School of Pharmacy offers graduate programs in the basic pharmaceutical sciences and in behavioral and administrative pharmacy, leading to the degrees of master of science and doctor of philosophy. These research-oriented programs are sufficiently flexible to accommodate individual interests, capabilities, and potential of the student for maximum academic development in becoming an accomplished research scholar and teacher. For general admission, applicants must satisfy the requirements for all graduate students entering WVU. For admission with regular student status, the applicant must possess a baccalaureate degree in a suitable academic area, an overall grade-point average of at least 2.75, and an aptitude and interest for graduate work in the pharmaceutical sciences. Applicants not admitted with regular student status may be considered for alternative admission status. Graduate Record Examination scores in the verbal, quantitative, and analytical portions of the examination are

required of all students, and TOEFL, or similar scores, are additionally required of international applicants. For applicants in the area of behavioral and administrative pharmacy, test scores on the Graduate Management Admissions Test (GMAT) are acceptable, although GRE scores are preferred.

No course credits with a grade of less than C may be counted toward fulfilling credit-hour requirements for a graduate degree. Furthermore, a cumulative grade-point average of no less than 3.0 in all graduate courses must be obtained by the student to qualify for an advanced degree.

Master of Science

Program Students admitted for the master of science (M.S.) may specialize in behavioral and administrative pharmacy, pharmacology and toxicology, pharmacognosy, pharmaceutical chemistry, industrial pharmacy, medicinal chemistry, pharmaceuticals, biopharmaceuticals, and pharmacokinetics.

To be eligible for the M.S. degree, students must complete a minimum of 30 hours of graduate credit, of which no more than six hours may be for research and thesis.

Upon completion of course work and research requirements, and after submission of the thesis, an oral examination for the thesis defense will be administered by the student's advisory committee.

Doctor of Philosophy

Program Students admitted for the doctor of philosophy (Ph.D.) degree program may choose among several specialty areas, which include medicinal chemistry, pharmaceuticals, biopharmaceuticals/pharmacokinetics, and behavioral and administrative pharmacy.

Course Work The student's first semester is usually occupied with course work while under the guidance of the assistant dean for research and graduate programs. During this period, a student will confer with faculty members in the student's area of interest concerning a possible research project, and a major professor should be chosen by the end of the first semester of graduate study. Prior to the third semester for M.S. students or the fourth semester for Ph.D. students in the program, under the direction of the agreed upon research advisor, the student shall have completed the process of selecting members of their masters thesis (minimum of 3) or doctoral dissertation (minimum of 5) research committee.

The interest to pursue the M.S. degree en route to the Ph.D. should also be stated at this time. Students must complete all requirements for the M.S. degree except the preparation and defense of the thesis in order to advance in the Ph.D. program. With committee advice, the student, however, may elect to prepare and defend a thesis to obtain the M.S. before the Ph.D.

Study Plan A formal plan of study must be submitted by the student upon completion of 30 credit-hours (or 18 credit-hours for the M.S.) of formal graduate course work. With guidance from the research advisory committee and by the end of the second year in the program, the student should have completed the language/research tool requirements.

Candidacy To be admitted for candidacy of the Ph.D. degree, the student must satisfy the above requirements and pass oral and written qualifying examinations. After admission to candidacy for the Ph.D., a student normally devotes substantial time to an original research project that culminates in a dissertation. The dissertation must be satisfactorily completed and defended at an oral examination before the recommendation to award the Ph.D.

Pharmacy (PHAR)

300. *Industrial Pharmacy*. I. 4 hr. Major aspects and principles of dosage form development and manufacture. Structure of industry and government influences. Laboratory experiences in manufacturing and development techniques.

301. *Advanced Biopharmaceutics*. I or II. 3 hr. Concepts of biopharmaceutics and pharmacokinetics in relation to the design and evaluation of dosage forms and determination of rational dosage regimens in health and disease. (II = odd years.)

302. *Advanced Pharmaceutics*. I or II. 3 hr. Physiochemical and biopharmaceutical principles involved in disperse systems (liquid, semisolid, and solid) which function as dosage forms. Considerations of properties of solid dispersions, micromeritics, diffusion of liquid dispersions, interfacial phenomena, emulsification, suspensions, prolonged action medication, etc.

323. *Economics of the Pharmaceutical Industry*. I or II. 3 hr. History, background, and formation of major drug industries, Oligopolistic practices, mergers, combines, costs of research, and production.

375. *Advanced Pharmaceutical Analysis 1*. I or II. 3 hr. Spectroscopic and chromatographic methods of analysis with emphasis on their applications in pharmaceutical problems and in biological sciences.

376. *Advanced Pharmaceutical Analysis 2*. I or II. 3 hr. Continuation of PHCH 375, with emphasis on development of electroanalytical methods, immunologic assays, and preparation of samples from pharmaceutical dosage forms and from biological materials.

390. *Special Topics*. I, II, S. 1-4 hr. Didactic courses offered as needed in medicinal chemistry, pharmaceutics, pharmacokinetics, behavioral and administrative pharmacy, scientific writing, and grantsmanship.

391. *Seminar in Pharmaceutical Sciences*. I, II. 1 hr. PR: Consent. A multidisciplinary weekly presentation and discussion of special topics and research in the pharmaceutical sciences. (Weekly attendance is required and grading is on an S/U basis only.)

396. *Special Problems in Pharmaceutical Sciences*. I, II, S. 1-3 hr. Where special interest is shown by the student in an area other than of the student's thesis research, a faculty member will supervise individual study and research.

484. *Special Seminar*. I, II, S. 1-6 hr. For use by disciplines in the pharmaceutical sciences wishing to have graduate students and faculty participate in seminars and group discussion on specialized or technical topics at the advanced level. (In behavioral and administrative pharmacy this course is required every semester.)

490. *Teaching Practicum*. I, II. 1-3 hr. PR: Graduate standing and consent. Supervised practices in college teaching of pharmacy.

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.

496. *Graduate Seminar*. I, II. 1 hr. PR: Consent. Formal presentation by graduate students to assembled graduate faculty and students of research or special topics approved

by advisor. Title to be presented at start of semester. Required at least once annually. (Grading is S/U.)

497. *Research*. I, II, S. 1-15 hr.

498. *Thesis*. I, II, S. 2-4 hr. PR: Consent.

School of Physical Education

Dana D. Brooks, Ed.D., Dean

Lynn Housner, Ph.D., Assistant Dean

Dallas Branch, Jr., Ph.D., Coordinator, Sport Management

Betsy Schmidt, M.Ed., Interim Coordinator, Athletic Training

Andrew Ostrow, Ph.D., Coordinator, Sport Behavior

Robert L. Wiegand, Ed.D., Coordinator, Teacher Education

Rachel Yeater, Ph.D., Coordinator, Exercise Physiology

Daniel Ziatz, Ph.D., Coordinator, Athletic Coaching Education

Andrew H. Hawkins, Ed.D., Graduate Program Coordinator

The School of Physical Education is organized into five programs: athletic coaching, athletic training, sport behavior, sport management, and teacher education.

The doctoral program administered through the School of Physical Education has three majors areas: sport behavior, teacher education, and exercise physiology. (For program description of the last, see exercise physiology in the School of Medicine.) The School's master's program allows specialization in teacher preparation, athletic training, athletic coaching education, sport behavior, and sport management leading to a master of science in physical education.

The facilities of the School of Physical Education include the gymnasium, dance studio, and swimming pool in E. Moore Hall; a gymnasium in Stansbury Hall; bowling lanes in the Mountainlair; indoor track, sports area, weight training room, martial arts room, and rifle range in the Shell Building; outdoor areas include the stadium, tennis courts, archery range, soccer and field hockey fields, and outdoor track; and the Natatorium with its pool and diving well.

The Coliseum contains the Ray O. Duncan Reading Room, classrooms and seminar rooms, faculty offices, a large gymnasium, a dance studio, racquetball and squash courts, and sport behavior laboratory. Additional faculty and staff offices are in E. Moore Hall, Stansbury Hall, the Natatorium, and the Shell Building.

For additional information, please contact the Graduate Coordinator, School of Physical Education, 210 Coliseum, P.O. Box 6116, West Virginia University, Morgantown, WV 26506-6116. Telephone (304) 293-3295 X 210.

Graduate Degrees in Physical Education

Physical Education M.S., Ed.D.

Graduate Faculty

† Indicates regular membership in the graduate faculty.

* Indicates associate membership in the graduate faculty.

Professors

Carl P. Bahneman, Ph.D. (U. Pitt). Teacher behavior, Administration.

*Dana D. Brooks, Ed.D. (WVU). Dean. African American sport, Social/psychological aspects of sport, Youth sport.

*J. William Douglas, Ph.D. (Ohio U.). Management theory, History and philosophy of sport.

†Andrew H. Hawkins, Ph.D. (Ohio St. U.). Graduate coordinator. Teacher education.

†Lynn Houser, Ph.D. (U.P.H.). Assistant Dean. Teacher preparation.

†Andrew C. Ostrow, Ph.D. (U.C.-Berkeley). Program coordinator, Sport Behavior. Physical activity and aging, Psychological assessment

*Robert L. Wiegand, Ed.D. (U. Ga.). Program coordinator, Physical Education/Teacher education, Curriculum.

Associate Professors

*William L. Alsop, Ed.D. (WVU). Sport studies, Sport management.

Kittie Blakemore, M.S. (WVU). Teacher preparation.

Linda Carson, Ed.D. (WVU). Motor development.

*Floyd Jones, Ph.D. (U. Pitt.). Pedagogy cognitions, At-risk preadolescents and summertime learning deficiencies.

Bruce Wilmoth, M.S. (Brigham Young U.). Teacher preparation.

*Daniel Ziatz, Ph.D. (U. Utah). Pedagogy, Athletic coaching education, Wellness/Fitness.

Assistant Professors

*Dallas D. Branch, Jr., Ph.D. (Ohio U.). Program coordinator, Sport Management. Sport management, Sport marketing.

Linda Burdette, M.S. (WVU). Teacher preparation.

*Edward Etzel, Ed.D. (WVU). Sport psychology, Performance enhancement, Counseling athletes, Psychological aspects of injury.

John C. McGrath, M.S. (Bemidji St. Co.). Teacher preparation.

*Frank Perna, Ed.D. (Boston U.). Health psychology, Performance enhancement, Athletic career transition.

Vincent Stilger, H.S.D. (Ind. U.). Undergraduate Coordinator, Athletic Training.

Laura Treanor, Ed.D. (VPI). Teacher preparation, Student teacher, Pedagogical kinesiology.

Sandra K. Vanin, Ed.D. (WVU). Teacher preparation, Adapted physical education, Wellness/fitness programs for adults with special needs.

Lecturers

Nate Carr, B.A. (Iowa St.U.). Teacher education.

Andrew Llaguno, M.S. (Old Dominion U.). Athletic training.

Denise Massie, M.S. (Old Dominion U.). Athletic Training.

Randall Meador, M.S. (WVU). Athletic training.

Elizabeth A. Schmidt, M.S. (U. Va.). Interim Program Coordinator, Athletic Training.

Program

Graduate studies in physical education leading to a doctor of education are available in three major areas: sport behavior, teacher education, and exercise physiology. The following are admission criteria for students to be admitted with regular status to the Ed.D. in those areas.

Application Deadline

Application procedures must be completed by March 1 for the M.S. or Ed.D. programs of the year in which the applicant intends to begin their program. The application for graduate school, official transcript(s), and application fee must be submitted to the Office of Admissions and Records. Upon receipt of the application, transcripts, and above admission criteria, the student's credentials are reviewed by an appropriate screening committee. Students who seek a graduate assistantship should apply by March 1. Information and applications for graduate teaching and research assistantships can be obtained from Carol Straight, School of Physical Education, Records Office, P.O. Box 6116, Morgantown, WV 26506-6116.

Doctor of Education

Admission Criteria

- Undergraduate grade-point average of 3.0 from an approved institution.
- Master's degree grade-point average of 3.0 from an approved institution (3.5 minimum for Sport Behavior).
- Graduate Record Examination score of 1000 (verbal/quantitative) or 1500 (verbal/quantitative/analytical); 1050 (verbal/quantitative) for sport behavior; or Miller Analogies Test score of 55.
- TOEFL score of 550 (international applicants).
- Three letters of reference.
- Writing sample (two- to three-page) summary of your professional background, professional aspirations, research experience (sport behavior).

Doctoral Committee and Examination Once the student is admitted to the program, the student—in concert with the advisor—selects a doctoral committee. It is this committee's responsibility to aid the student in planning the total program. During the process of completing the program, the student is expected to fulfill a residency requirement specified by the committee.

As the student completes the course work, application can be made to complete the final comprehensive examination. This examination consists of scholarly tasks designed to function as a comprehensive learning experience. The examination will be constructed by the student's doctoral committee. Students who do not successfully complete this examination may be permitted to attempt the examination one more time pending an appeal and subsequent sanction of the student's doctoral committee. There must be a time period of at least six months between the first and second examinations.

Candidacy Upon successful completion of the final comprehensive examination, the student may present to the doctoral committee a prospectus of the dissertation. If the opinion of the committee is such that the student may proceed with the dissertation, the student is admitted to candidacy.

Oral Defense Upon the completion of the dissertation, the candidate will appear before the doctoral committee for purposes of orally defending the study. Successful defense of the dissertation results in the awarding of the degree. All requirements must be completed within five years after admission to candidacy.

Master of Science Admission Criteria

- Undergraduate grade-point average of 2.75 for regular status (3.0 minimum grade-point average for sport behavior major).
- Graduate Record Examination score of 1000 (verbal/quantitative) or Miller Analogies Test score of 50.
- TOEFL score of 550 (international applicants).
- Three letters of reference.
- Personal interview (when possible).
- One- to two-page statement on background and professional goals (sport behavior).
- Resume and two-page autobiography (sport management).

Athletic Coaching Education

This major is designed to develop the skills and knowledge necessary to be an athletic coach. The medical, legal, growth and developmental, psychosocial, biophysical, and technical aspects of coaching are emphasized.

Athletic Training

Completion of the M.S. program with NATA certification permits the graduate to pursue a wide range of employment at the secondary, collegiate, professional, clinical, or corporate levels. The graduate major in athletic training offers the following:

- One-year program
- Two-year program
- West Virginia state certification

All of the above programs include clinical experience.

Both the one-year and the two-year programs are designed for individuals who are NATA certified or certification eligible. Courses are intended to augment the student's academic background and further enhance clinical skills. All applicants must comply with WVU requirements for graduate study and the requirements of the athletic training program.

The West Virginia state certification program is designed for teachers already holding a professional endorsement in a major field. Students must complete a core of courses at the graduate level, complete required undergraduate courses, and make application to the WV Department of Education for certification. This program requires a minimum of 37 credit hours. Certification enables teachers to work as a *state certified* athletic trainer in WV public schools.

Sport Behavior

Students admitted into the sport behavior major may select either the 36 credit hour thesis option or the 48 credit hour internship option.

Sport Management

The sport management major requires 39 credit hours, including a six hour internship. Applicants must send all application materials to the program coordinator by March 1. The selection process for the 15 applicants who are accepted into the program is conducted during the spring semester. A personal interview is a part of the selection process. Applicants will be notified of their selection by May 15.

Teacher Education

Students are admitted to physical education teacher education for work leading to the master of science degree if they hold a baccalaureate degree from an approved institution of higher education, are certified or certifiable to teach physical education in the public schools, have a 2.75 undergraduate grade-point average, and satisfy prerequisites in the courses for which they register. The physical education teacher education program requires one year of study and field experience.

Provisional Admission

Students who do not meet the 2.75 grade-point average requirement are admitted as provisional graduate students if their GPA is above 2.50; they are required to attain a 3.0 grade-point average in the first 12 hours of advisor-approved course work in order to be reclassified as a regular graduate student. Courses taken in off-campus education are accepted for degree purposes if the student has had prior approval from the student's advisor. In order to receive the degree, the student must have a minimum average of 3.0 in all course work leading toward the degree and satisfy all department and University requirements.

Athletic Training (ATTR)

218. *Gross Anatomy Lab*. 1 hr. Analysis of gross anatomy and systems of the trunk and extremities; cadaver laboratory experience.

219. *Gross Anatomy*. II. 3 hr. PR: Consent. Designed to provide an overview of body systems and gross anatomy of the trunk and extremities.

220. *Advanced Athletic Training* 1. S. 3 hr. PR: ATTR 121, EXPH 164, 165, CHPR 70 or consent. Designed to provide an in-depth analysis of life-threatening situations in athletics, athletic conditioning, and general rehabilitation concepts.

221. *Advanced Athletic Training* 2. I, S. 3 hr. PR: ATTR 121, 219, EXPH 164, 165, CHPR 70 or consent. Designed to investigate tissue repair, physiology of hot and cold treatment, therapeutic modalities and pharmacology relevant to athletic injury management.

222. *Advanced Athletic Training 3*. II, S. 3 hr. PR: ATTR 219, 220, 221 or consent. Designed to provide in-depth analysis of athletic injury mechanisms, injury evaluation techniques and rehabilitation; and muscle isolation techniques.

223. *Athletic Training Practicum 1*. II, 3 hr. PR: Consent. Practical application of athletic training techniques related to general rehabilitation concepts.

323. *Athletic Training Practicum*. I, II, S. 1-6 hr. PR: Consent. Designed to provide experience in various practical situations in athletic training and other related areas.

324. *Issues in Athletic Training*. S. 3 hr. PR: Consent. Designed to analyze, in-depth, various issues and policies in athletic training relevant to training room administration, protective equipment, liability in athletics, and other selected topics.

391. *Advanced Topics*. I, II, S. 1-6 hr.

Physical Education Teacher Education (PET)

300. *Workshop in Physical Education*. I, II, S. 1-15 hr.

305. *Professional Issues in Physical Education*. S. 3 hr. PR: Completion of 24 graduate hours or consent. Designed to examine current professional issues in physical education and the impact of these issues on the professional's life.

315. *Research Methodology in Physical Education*. I, S. 3 hr. PR: Graduate standing or consent. Application of historical, descriptive, and experimental research strategies and designs to physical education.

336. *Instructional Methods for Physical Education*. I, S. 3 hr. PR: PET 315 or consent. Designed to provide physical educators with the methodological skill necessary to comply with Public Law 94-142 (Education for All Handicapped Children Act). The research justification for the methodological approaches examined will be emphasized.

338. *Operant Principles for Physical Education*. II, S. 3 hr. PR: PET 315 or consent. Designed for the use and evaluation of operant principles in the development and control of motor behavior in physical education. Applications will be made to traditional group and individually prescribed instructional systems in physical education.

344. *Pedagogical Kinesiology*. I, S. 3 hr. Qualitative analysis of fundamental motor skills and sport-specific performances; discussion of research, application of self-directed experiments, and presentations of selected research papers. (Offered fall and every third summer.)

346. *Curriculum in Physical Education*. I, S. 3 hr. PR: PET 315 or consent. Designed to examine the factors affecting curriculum development. Emphasis on research in the changing curriculum, and the selection and sequencing of developmentally appropriate activities for early, middle, and adolescent childhood.

366. *Motor Development*. I, S. 3 hr. PR: PET 315 or consent. Designed to examine developmental motor skill acquisition across the entire life span. Hereditary and environmental factors unique to the motor-skill development of the maturing individual will be emphasized.

368. *Infant/Early Childhood Motor Development*. II, S. 3 hr. PR: PET 315 and 366 or consent. Examination of motor development during infancy and early childhood focusing on physical education's interactive role with the developmental process. Emphasizing current developmental research related to the area.
370. *Middle Childhood/Adolescent Motor Development*. II, S. 3 hr. PR: PET 315, 366 or consent. Examination of motor development during middle childhood and adolescence focusing on physical education's interactive role with the developmental process. Emphasizes current developmental research related to the area.
371. *Motor Development in Special Populations*. II, S. 3 hr. PR: PET 315, 366 or consent. Designed to examine the motor developmental patterns of various special population groups focusing on physical education's interactive role with the developmental process. Current developmental research related to the area will be emphasized. (Offered every third summer.)
391. *Advanced Topics*. I, II, S. 1-6 hr.
397. *Research/Thesis*. I, II, S. 1-15 hr.
446. *Advanced Measurement in Physical Education*. II, S. 3 hr. PR: PET 315. Designed to extend and apply the basic concepts of measurements and statistical evaluation to physical education.
460. *Management Processes in Physical Education*. II, 3 hr. PR: Graduate standing or consent. Designed to explore analytically the situational, relational processes between the administrator of physical education school programs and the teacher of physical education, the physical education facility, and the physical education planned learning environment.
465. *Professional Physical Education Resource Seminar*. I. 3 hr. PR: Graduate standing. (Required for all doctoral students.) Designed as an introductory seminar for doctoral professional physical educators. Discussion, debate, and position statements on critical issues facing the physical education profession.
480. *Dissertation/Thesis Seminar*. I, II, S. 3 hr. PR: Graduate standing and PET 315. (Required for all doctoral students.) Designed to critically analyze the graduate student's dissertation or research proposal.
490. *Teaching Practicum*. I, II, S. 3-15 hr.
491. *Advanced Study*. I, II, S. 1-6 hr.
- 492-495. *Special Seminars*. I, II, S. 1-6 hr. each.
496. *Graduate Seminar*. I, II, S. 1-6 hr.
497. *Research*. I, II, S. 1-15 hr.
498. *Dissertation*. I, II, S. 1-15 hr.
499. *Colloquium*. I, II, S. 1-6 hr.

Sport Studies (SS)

225. *Sport Facility Planning*. II. 3 hr. PR: Consent. An in-depth study of sport facilities, including planning, design, liability, and facility management concepts and evaluation.

226. *Legal Liability in Sport*. I. 3 hr. An overview of the legal aspects of sports; contracts, tort law, drug testing, rights of athletes, and product liability; legal duties of coaches, facilities supervisors, and athletic directors.

227. *Legal Issues in Sport Administration*. II. 3 hr. PR: Sport Management majors only. The NCAA, its rules, and its regulations: In-depth study of professional sport leagues, their constitution, bylaws, regulations, collective bargaining agreements, standard player contracts; legal issues involving sport agents.

310. *Sport Broadcasting*. I. 3 hr. PR: Graduate standing or consent. The collegiate and professional sport environment in radio and television; elements of radio/television production; ratings and marketing/sales techniques.

315. *Research Methodology in Physical Education*. I, S. 3 hr. PR: Graduate standing or consent. Application of historical, descriptive, and experimental research strategies and designs to physical education. (Also listed as PET 315.)

316. *Sport Marketing Research Methods*. I. 3 hr. PR: Graduate standing or consent. Application of the scientific method to sport marketing; emphasis on evaluating and conducting survey research in sport marketing; marketing project includes consumer behavior research in sport settings.

320. *Individual Interaction in Sport and Physical Activity*. I, S. 3 hr. PR: SS 315. Designed to acquaint the student with the reciprocal relationships between sport and physical activity and the societies and cultures out of which sport emerges.

340. *Psychology of Sport and Physical Activity*. I, S. 3 hr. PR: SS 315. Psychological effects and implications of man's participation in sport and physical activity. Emphasis is on the personality and behavioral and motivational dynamics of sport involvement.

345. *Group Influences in Sports*. I. 3 hr. PR: SS 320, 340. The manner and degree to which individuals are affected by involvement in sport and group interactions.

350. *Paciolan Computer Systems*. I, II. 3 hr. PR: Sport management majors only. Computer laboratory; emphasis on general ledger (budgeting), support group (fund raising), and ticketing software of the PSI sport computer system.

370. *Sport Finance*. II. 3 hr. PR: Graduate standing or consent; majors only. Financial operations and economic impact of scholastic, intercollegiate, and professional sport administration; concepts of budgeting, auditing, reporting, and computer use; current developments in the field.

391. *Advanced Topics*. I, II, S. 1-6 hr.

397. *Research/Thesis*. I, II, S. 1-15 hr.

425. *Educational Sport*. II. 3 hr. PR: STAT 311, SS 465. The group dynamics of the sport situation for purposes of gaining insight into techniques and methods of modifying social behavior through physical education sport activities.
446. *Advanced Measurement in Physical Education*. II, S. 3 hr. PR: SS 315. Extension and application of basic concepts of measurement and statistical evaluation to physical education.
450. *Sport Marketing*. I. 3 hr. PR: Graduate standing. Advanced analysis of marketing sport enterprises; the marketing planning process and marketing information systems.
460. *Sport Management Processes*. II. 3 hr. PR: Consent. Analysis of management processes utilized in sport businesses. A focus is on the planning, organization, leading, and evaluation processes that are unique to the sport industry. Discussion, debate, and position papers on these four management processes.
465. *Professional Physical Education Resource Seminar*. S. 3 hr. PR: Graduate standing. Introductory seminar for doctoral professional physical educators. Discussion, debate, and position statements on critical issues facing the physical education profession. (Required for all doctoral students.)
480. *Dissertation/Thesis Seminar*. I, II, S. 3 hr. PR: Graduate standing. Critical analysis of the graduate student's dissertation or research proposal. (Required for all doctoral students.)
491. *Advanced Study*. I, II, S. 1-6 hr.
- 492-495. *Special Seminars*. I, II, S. 1-6 hr. ea.
496. *Graduate Seminar*. I, II, S. 1-6 hr.
497. *Research*. I, II, S. 1-15 hr.
498. *Dissertation*. I, II, S. 1-15 hr.
499. *Colloquium*. I, II, S. 1-6 hr.

School of Social Work

Karen V. Harper, Ph.D., Dean

Graduate Program in Social Work

Master of Social Work (M.S.W.)

The School of Social Work began as a department in the College of Arts and Sciences in the early 1930s. In 1971, the School became an independent unit, located in Allen Hall on the Evansdale Campus. All degree programs offered by the School are accredited by the Council on Social Work Education, and our graduates meet the criteria for seeking social work licensure in most states.

The graduate program in social work offers advanced study and training in preparing social workers for leadership roles in small towns and rural areas. The School of Social Work is nationally recognized in the area of rural social work practice and non-profit management. Faculty regularly contributes to the social work field through presentations, papers, conferences, seminars, and research. Students have the opportunity to focus their practice interests by selecting an area of social work practice intervention as well as a Field of Practice concentration within our M.S.W. program. Currently, the School supports practice tracks in Direct Practice, Community Organization and Social Administration, and Advanced Generalist; and Fields of Practice in the areas of Aging and Health Care, Children and Families, and Mental Health. Students have the opportunity to do their field internships with agencies throughout West Virginia and adjacent areas. A dual degree option is also offered in conjunction with the Department of Public Administration in the College of Arts and Sciences.

The School of Social Work supports both full-time and part-time graduate study at the main campus and part-time graduate study at our off-campus site in Charleston, the state capitol. Students who have graduated from a baccalaureate program in social work accredited by the Council on Social Work Education may request a review for advanced standing in the M.S.W. program when they apply for admission.

Students admitted to the M.S.W. program are not permitted to enroll in 200 level courses to meet graduate degree requirements. Students interested in applying to the School or wishing additional information should address inquiries to M.S.W. Admissions, School of Social Work, West Virginia University, P.O. Box 6830, Morgantown, WV 26506-6830. Phone: (304) 293-3501.

Graduate Faculty

† Indicates regular membership in the graduate faculty.

Professors

Marjorie H. Buckholz-Cleveland, Ph. D. (WVU). *Emerita*.

†Karen V. Harper, Ph.D. (Ohio St. U.). Dean. Social administration, Child welfare.

†Nancy L. Lohmann, Ph.D. (Brandeis U.). Social gerontology, Research measurement.

†Roger Lohmann, Ph.D. (Brandeis U.). Nonprofit management, Social gerontology, Rural social services.

Robert A. Porter, Ph.D. (Brandeis U.). *Emeritus*.

Victor L. Schneider, Ph.D. (U. Mich.). *Emeritus*.

LeRoy G. Shultz, M.S.W. (Wash. U.). *Emeritus*.

Associate Professors

†Patty A. Gibbs, Ed.D. (WVU). B.S.W. Program Director. Death and dying, Women's issues.

†Barry L. Locke, Ed.D. (WVU). Assistant Dean & M.S.W. Program Director. Social Work in rural areas, Generalist practice, Program development.

Caroline T. Mudd, M.S.W. (U. Penn.). *Emerita*.

Neal A. Newfield, Ph.D. (Texas Tech U.). Marriage and family therapy, Clinical practice, Drug-free communities.

Assistant Professors

Eleanor Blakely, Ph.D. (UNC). Social welfare policy/administration.
Gregory Hungerford, Ph.D. (Ohio St. U.). Family issues, Criminal justice.
Jerome R. Kolbo, Ph.D. (U. Minn.). Child welfare, Family violence.
Elizabeth Randall, Ph.D. (U. GA.). Clinical social work, Mental health. Clinical Instructor.
Joan E. Saltman, Ph.D. (U. of Md.). Human Behavior, Family social work, Multicultural issues.

Clinical Instructor

Doris Nicholas, M.S.W. (WVU). Social Work in health care, AIDS/HIV, Multicultural practice.

Academic Professionals

Natalie Ames, M.S.W. (WVU). Rural health care. Curriculum Coordinator.
R. Larry Beckett, M.S.W. (WVU). Director Off-Campus Program. Social Planning, Health Care Policy.
Mary Alice Dunn, M.S.W. (WVU). Program Manager for Continuing Education.
Helen M. Hagerty, M.S.W. (U. Pitt.). Coordinator of Field Instruction.
Brenda Morgan-Patrick, M.S.W. (WVU). Admissions & Academic Counselor.

Social Work

Karen V. Harper, Ph. D., Dean of School of Social Work
708 Allen Hall

Degree Offered: Master of Social Work

Accreditation and Licensure

The School of Social Work and its degree programs are fully accredited by the Council on Social Work Education. Graduates of the M.S.W. program are eligible to sit for licensure examinations as social workers in West Virginia and most other states. The graduate program is part of the comprehensive program of professional education in social work offered by the School of Social Work, including degree programs at the baccalaureate and master's levels and a range of continuing education opportunities on the campus and in other areas of West Virginia.

Program Emphasis

Social work is primarily concerned with enhancing the problem-solving, coping, and developmental capacities of people, promoting effective and humane operation of resources and service delivery systems, linking people with appropriate resources and service opportunities, and improving social policy.

Toward this end the graduate program concentrates upon offering advanced specialized training for social work practice, with an emphasis on rural areas and small towns.

The School of Social Work is nationally recognized in the area of rural social work practice, and the faculty members regularly contribute to this field through presentations, papers, conferences, and research.

Career Goals

Graduates are employed throughout the United States and Canada. They work as individual, family, and group treatment specialists, planners, community organizers, and social researchers. They also work as social work educators and administrators in a variety of programs such as mental health clinics, hospitals, correctional institutions, courts, delinquency programs, aging programs, family counseling agencies, child protective agencies, public welfare departments, child development programs, drug and alcohol abuse programs, public schools, community action agencies, settlement houses, city governments, state government planning agencies, federal administrative agencies, and private research and development organizations concerned with human problems.

There has been a constant growth in the need for professional social workers. It is anticipated by the Bureau of Labor Statistics and other research bodies that the demand

for social workers will continue to increase in numbers and in varieties of programs in which social workers are employed. The WVU social work curriculum is designed to help students prepare for these careers. Students are required to work closely with their academic advisors in selecting appropriate components in class and field learning to meet their individual needs.

Curriculum and Degree Requirements

Degree Requirements

The degree of master of social work (M.S.W.) is conferred upon those students who satisfactorily complete the requirements as established for graduate education. These requirements are:

- Satisfactory completion of no less than 58 semester hours for those admitted to the regular M.S.W. program and 43 semester hours for those admitted to the advanced standing M.S.W. program. These hours may be earned through the Morgantown program on the main campus, as well as at the off-campus site at Charleston.
- Students may request transfer credit for up to 12 hours earned in graduate study in approved courses. Requests for such transfer credit must be made at the time of application to the program and will be evaluated by the Admissions Committee.
- Satisfactory completion of all components called for by the degree track to which students are admitted in the graduate program.

Curriculum Components

These components include course work in social work practice, social welfare policy, human behavior and social environment, social work research, a field of practice area, and field instruction. A copy of the typical plan of study for degree candidates is available upon request from the School of Social Work.

Practice Tracks

- Direct practice: This track prepares students with the knowledge and skills to provide direct and clinical services to individuals, families, and small treatment groups.
- Community organization and social administration: This track prepares students with the knowledge and skills to provide leadership to communities in the development, administration, and support of service programs.
- Advanced generalist: This track prepares students who wish to have a broad knowledge and skill base for a variety of advanced practice roles.

Fields of Practice

Aging and Health Care

The aging and health care concentration provides students for careers in aging and health services delivery. Emphasis is on geriatric social work practice in health care settings, including hospitals, nursing homes, and rural primary care clinics. Students acquire knowledge and skills in carrying out professional roles in discharge planning, creating support networks, and serving as members of medical ethics committees.

Children and Family

The children and family concentration provides students with the knowledge, skills, and values that enable the student to perform competently in human service systems programs and policies directly affecting family well-being. These social work roles encompass preventing and treating neglect, abuse and exploitation; developing and supervising alternative family care systems; and deinstitutionalization. Particular emphasis is placed on direct practice roles in delivering family services.

Mental Health

The mental health concentration provides students with a generic model of practice as adapted to the evolving field of mental health. Particular knowledge and skill emphasis is placed on brief treatment models, the use of community support systems, and case management systems for independent living.

Field Instruction

Field instruction opportunities are available throughout West Virginia and adjacent areas, as well as in a select number of settings outside the region. Classes focus upon a blend of local, regional, and national perspectives. Field instruction provides the student with an opportunity to test classroom knowledge as well as to develop and refine advanced practice skills within the chosen field of practice area.

Field placement is typically completed on a concurrent plan requiring 24 hours of field instruction activity each week throughout the second year of study. Part-time field instruction options may be negotiated as needed, but must be completed within the four year time frame for part-time study.

Regular M.S.W. students are in the field between July 1 and May 15 of the second year of study. Advanced standing M.S.W. students are in the field between August 15 and May 15 of the second year of study. Students are required to take at least 3 credits of classroom course work concurrently with field placement and to complete assignments designed to facilitate the integration of field and classroom study.

Decisions regarding the field placement assignment are jointly reached by the student, faculty advisor, and field instruction coordinator. Only sites on the School of Social Work's approved list, there are over 125 approved agencies, may be used for field instruction.

GPA Requirements for Good Standing

All graduate courses must be completed with a grade of C or better and students must have an overall minimum grade-point average of 2.75 prior to entering field placement and to be eligible for graduation. Students may repeat any course for which the final grade is less than C one time only.

Joint M.S.W./M.P.A.

A joint degree option resulting in the master of social work (M.S.W.) and master of public administration (M.P.A.) is available through the School of Social Work and the Department of Public Administration of the College of Arts and Sciences. For a student admitted to the regular M.S.W. program, a total of 82 credit-hours are required to meet the joint degree requirements. For a student admitted to the advanced standing M.S.W. program, a total of 67 credit hours are required to meet joint degree requirements. Many students complete such requirements through one or more additional semesters of study beyond the semesters required for the M.S.W. degree. Students admitted to the M.S.W. degree program may not receive credit toward the degree for courses numbered 200 to 299. Students wishing to transfer credit from another program are also subject to this restriction. Applicants for the joint degree program apply to each program separately, specifying on each application that they are a joint degree applicant. Applicants must meet the admission requirements of each program and acceptance by one program does not guarantee acceptance by the other.

Additional information and descriptive materials about the joint degree program are available from either M.S.W. Admissions, School of Social Work, West Virginia University, P.O. Box 6830, Morgantown, WV 26506-6830, or the Department of Public Administration, West Virginia University, P.O. Box 6322, Morgantown, WV 26506-6322.

Admission to the M.S.W. Program

Students admitted to the graduate program may be admitted to the regular M.S.W. program (58 credit hours) or to the advanced standing M.S.W. program (43 credit hours). Through both the regular M.S.W. program and the program of advanced standing, students are exposed to the areas of social work practice, social welfare policy, theories of human behavior and social environments, social work research, and field instruction. Students requesting admission must demonstrate the following:

- Proof of academic achievement. Graduate regulations require an undergraduate grade-point average of at least 2.75 for approval of candidates as a regular graduate student. An accepted applicant whose grade-point average is less than 2.75 is classified as provisional. See the graduate catalog section titled Classification of Graduate Students for a description of admission categories.

- Aptitude for graduate study as evidenced by performance on the Graduate Record Examination.

- Evidence of potential to practice social work, such as commitment to human service, and a concern and ability to work effectively with people.

- Evidence of having successfully completed at least 30 hours of upper-level courses in the liberal arts.

For full-time applicants, preference will be given in admissions to students who have a total of at least one year of paid and/or volunteer human service work experience. Applicants for the part-time program must have the equivalent of two years work experience in human services.

Admission Eligibility

Regular Program

Applicants meeting the following criteria may be eligible for admission to the regular M.S.W. program (58 credit hours):

- Students with a baccalaureate degree in social work or social welfare whose cumulative grade-point average in their social work courses is below 3.0 (on a 4.0 scale).

- Students with a baccalaureate degree in social work or social welfare whose cumulative grade-point average in all courses is less than 2.75. Such students may be admitted as provisional students in the regular M.S.W. program.

- Students with a baccalaureate degree in a field other than social work.

If enrolled full-time, regular program students begin their study in August and are scheduled to complete their requirements within 21 months.

Advanced Standing

Increasingly aware of the maturation of baccalaureate social work education (in which the WVU School of Social Work has been a national leader), the graduate program provides the opportunity to simultaneously broaden and deepen the knowledge and skill levels of those with baccalaureate education in social work through a program of advanced standing.

For those who do not have a baccalaureate degree in social work or who do not qualify for the advanced standing program, the regular M.S.W. degree is offered (see above criteria).

Applicants meeting the following criteria are eligible for admission to the advanced standing M.S.W. program (43 credit hours):

- Students with a baccalaureate degree in social work from a program accredited by the Council on Social Work Education.

- Students who have a cumulative grade point average 2.75 or higher (on a 4.0 scale) in all courses.

• Students who have a cumulative grade point average of 3.0 or higher in their social work courses.

If enrolled as full-time students, advanced standing students begin their program of study in January and are scheduled to complete the program over the following 17 months.

Part-Time Study

Applicants may be admitted as part-time students to either the regular M.S.W. program or advanced standing M.S.W. program. Part-time students must follow a degree plan that provides for the appropriate sequencing of courses. Students are required to complete at least six credit hours each semester while enrolled as part-time students. The entire degree may be completed on a part-time basis; however, the plan of study must be completed within a four-year time span.

Application Deadlines

Applications must be completed by March 1. Applicants whose admission files are completed after the deadline date will only be considered if space is available.

Full and part-time students admitted to the regular program are required to begin their program of study in August (fall semester).

Full and part-time students admitted to the advanced standing program are required to begin their program of study in January (spring semester).

The School does not admit students at any times other than those outlined above. Students interested in applying to the School or wishing additional information should address inquiries to: M.S.W. Admissions, School of Social Work, West Virginia University, P.O. Box 6830, Morgantown, WV 26506-6830. Phone: (304) 293-3501.

Summary of Degree Requirements for Advanced Standing M.S.W. Program

Curriculum Area	Credit Hours
Foundation Courses	9
SW 321 Human Behavior and Social Environment	3
SW 333 Social Welfare Policy and Services	3
Social Research Methods (SW 316 or 318)	3
Required Practice Track (select one option)	6
Direct Practice (SW 343 & 349)	6
COSA (SW 351 & 354)	6
Advanced Generalist (SW 343, 349, 351 & 354)	12*
Practice Track Crossover (required for direct practice track and COSA track)	3
Direct Practice students take either SW 351 or 354	
COSA students take either SW 343 or 349	
Required Field of Practice (select one option)	3
Aging and Health Care (SW 381)	
Children and Families (SW 377)	
Mental Health (SW 374)	
Field of Practice Electives (determined by student interest)	6
Field Instruction	16
TOTAL	43

*Advanced Generalist students take all four of these courses instead of the crossover requirement and only one practice elective.

Summary of Degree Requirements for Regular M.S.W. Program

Curriculum Area	Credit Hour
Foundation Courses	
Human Behavior and Social Environment (SW 321 & SW 347)	6
Social Welfare Policy and Services (SW 331 & 333)	6
Social Research Methods (SW 313 & either 316 or 318)	6
Social Work Methods (SW 340)	3
Required Practice Track (select one option)	6
Direct Practice (SW 343 & 349)	6
COSA (SW 351 & 354)	6
Advanced Genralist (SW 343, 349, 351 & 354)	12*
Practice Track Crossover (required for direct practice track and COSA track)	3
Direct Practice students take either SW 351 or 354	
COSA students take either SW 343 or 349	
Required Field of Practice (select one option)	3
Aging and Health Care (SW 381)	
Children and Families (SW 377)	
Mental Health (SW 374)	
Field of Practice Electives (determined by student interest)	6
Field Instruction	19
TOTAL	58

*Advanced Generalist students take all four of these courses instead of the crossover requirement and only one practice elective.

Social Work (SOWK)

313. *Social Work Research Methods*. I, II. 3 hr. (Research Course.) Basic concepts in social research methods. Emphasis on conceptualization of social work problems for research, role of social science theories in research, measurement options in research design, and analysis of data.

316. *Evaluation Research in Social Work*. 3 hr. (Research Course.) PR: SOWK 313. Methods of collecting, analyzing and interpreting data on the need for, implementation and effects of social interventions. Examination of the effects of political, ethical and resource variables on the research process.

317. *Strategies of Community Research*. S. 3 hr. (Research Course.) PR: SOWK 313. Social systems approach to the study of community social phenomena in ecological context. Emphasis on the use of qualitative methods. Students engage in participant observation in natural field settings. (Graded as S or U.)

318. *Personal Practice Assessment*. I, II. 3 hr. PR: SOWK 313 or equiv. The use of single-system evaluation methods to assess the effectiveness of social work interventions, with an emphasis on using these tools to guide practice decision-making.

320. *Introduction to Growth and Behavior*. I. 3 hr. Study of behavior as basically learned responses acquired from social situations and experiences. Individual and group behavioral norms from varying and diverse sociocultural environments are examined.

321. *Introduction to Growth and Behavior*. II. 3 hr. PR: SOWK 310 or equiv. Further study of psychosocial and cultural determinants designed to increase knowledge and understanding of individual and group behavior through an analysis of social organizations with a special focus on the impact of deprivation.

323. *Social Support Systems*. I, II. 3 hr. (Human Behavior and Social Environment Course.) Social science theories pertinent to social support system concepts. Formally organized systems and natural helping networks are considered. Program models related to particular target populations, such as mentally ill, the aged, etc., are examined.

324. *Human Service Organizations*. II. 3 hr. (Human Behavior and Social Environment Course.) Forces that characterize the establishment, maintenance, and transformation of human service agencies.

331. *Social Welfare Policy and Services*. I. 3 hr. (Policy Course.) Introduction to the history, development, and implementation of social policy in the United State. Special emphasis is given to those policies which have the greatest impact on non-metropolitan areas and the Appalachian region.

333. *Social Policy Analysis*. II, S. 3 hr. (Policy Course.) PR: SOWK 331. Skill development in techniques of social policy analysis. Selection of analytical methods and issues offered in different sections.

340. *Introduction to Social Work Practice*. I. 3 hr. (Practice Course.) Focuses on developing the basic framework of social work practice theory and professional values to working with individuals, groups, families, and communities.

341. *Social Treatment Groups*. II. 3 hr. (Practice Course.) PR: SOWK 340. The use of social relationships in small groups in treating personal problems.

343. *Psychopathology and Social Work Practice*. I, II. 3 hr. PR: SOWK 340. Nature, presenting characteristics, and interventions with the major forms of mental and emotional maladjustment that impact social functioning, adaptation, and life satisfaction from the perspective of the social work profession.

345. *Supervision in Social Work*. II, S. 3 hr. (Practice Course.) PR: SOWK 340. Functions, conflicts, and dynamics of supervision of professionals, and the relationship of ethical and value principles.

347. *Multicultural Social Work Practice*. I, II. 3 hr. Understanding and appreciating human differences as encountered in professional practice. Practicing with sensitivity to influences such differences may present to the social worker.

349. *Advanced Practice with Individuals/Families*. I, II, S. 3 hr. PR: SOWK 340 or consent. Theories, concepts, and value issues associated with providing direct/clinical social work services to individuals. Students will also be involved with skill building exercises through classroom activities.

345. *Supervision in Social Work*. II, S. 3 hr. (Practice Course.) PR: SOWK 340. Functions, conflicts, and dynamics of supervision of professionals, and the relationship of ethical and value principles.

351. *Social Management/Rural Communities*. I, II. 3 hr. (Practice Course.) PR: SOWK 340. Practice issues in skill development and community organization and development with special emphasis on rural communities.

352. *Social Planning*. II. 3 hr. (Practice Course.) PR: SOWK 340. Practice issues in skill development related to social components of comprehensive planning and functional planning systems in health, aging, manpower, social service, and other areas.

354. *Social Agency and Program Administration*. I, II. 3 hr. (Practice Course.) PR: SOWK 340. Practice issues in skill development in programming, budgeting, organization, staffing, and control of social agencies and programs.

371. *Social Work With the Aged*. I. 3 hr. (Concentration Course.) Human aging as a problem in social theory, research, and practice.

372. *Concepts and Theories in Social Gerontology*. S. 3 hr. (Concentration Course.) PR: SOWK 371 or consent. Major conceptual and theoretical perspectives in social gerontology are applied to social work practice for the aged.

374. *Community Mental Health*. I. 3 hr. (Concentration Course.) An overview of the field of mental health which addresses major policy, program, practice, theory, and research issues as reflected in recent reports of the President's Commission on Mental Health. Current federal and state regulations and state plan documents are examined.

375. *Individual Consultation*. I, II, S. 1-3 hr. Individual directed study to develop extensive knowledge in social work areas of student's interest.

376. *Primary Prevention in Social Work*. S. 3 hr. (Concentration Course.) PR: SOWK 374 or consent. This course explores varying conceptual approaches to primary prevention, the social science theories and research on which they are based, and their adaption to major modes of social work practice. Specific substantive knowledge problems are addressed.

377. *Introduction to Family Social Work*. I. 3 hr. (Concentration Course.) Describes the demography of the population at risk, identifies family theory, major programs, and services and policies. Examines gaps in services and major styles of family intervention in social work roles.

378. *Family Victimology*. S. 3 hr. PR: SOWK 377 or consent. The interface of social work practice in family victimology, with emphasis on victim welfare policy and service, victim compensation programs, and victim prevention. Social concern for physical and sexual abuse, battery, and related topics.

379. *Social Work with Couples/Families*. 3 hr. (Concentration Course) PR: SOWK 377 or consent. This course explores social work practice focused on couples or families as a unit. Emphasis on intervention models oriented to couple and family relationship counseling and on clinical social work techniques.

380. *Special Topics*. I, II, S. 3 hr. Topics include: (A) Statistics for Social Work Practice; (B) Methods of Data Collection; (C) Computer Applications; (D) Family Sexuality; (E) Service Strategies of Aging; (F) Health Planning and Policy; (G) Program and Practice Models; (H) Social Work in Health Care; (I) Social Work with Substance Abuse.

381. *Social Work in Health Settings*. I. 3 hr. PR: SOWK 374. Comprehensive strategies for serving clients with physical and/or emotional problems and their families with an emphasis on direct practice approaches. Practice in traditional and nontraditional settings is examined.

481. *Advanced Field Instruction 1*. I, II, S. 5-14 hr. PR: Consent. Graduate field instruction in selected settings under the general direction of the faculty.

482. *Advanced Field Instruction 2*. I, II, S. 5-14 hr. PR: Consent. Graduate field instruction in selected settings under the general direction of the faculty.

497. *Research*. I, II, S. 1-15 hr.

Part 5 Special Opportunities

Harley O. Staggers National Transportation Center

David R. Martinelli, Ph.D., Director

Department of Civil and Environmental Engineering

The Harley O. Staggers National Transportation Center was created through federal legislation to serve as a nucleus for transportation research, education, service, and technology transfer for West Virginia and the Mid-Atlantic region. Since its creation, faculty associated with the center has performed research projects, technology transfer events such as short courses, and undergraduate and graduate educational activities.

The center is located at West Virginia University in the Department of Civil and Environmental Engineering (CEE). Faculty from the departments of CEE, Mechanical Engineering, Industrial Engineering, Business and Economics, Forestry, and Law and Medicine have all participated in research through the center. Over the years, the objectives of the center have included the following:

1. To promote and coordinate transportation related research activities at West Virginia University for all modes; particularly in the areas of traffic engineering, transportation economics, planning, infrastructure management, highway design, transportation safety, environmental issues, and structures and materials.
2. To serve as technical and educational support to West Virginia agencies, legislature, municipalities, and private citizens. For example, the center is available to advise legislative committees and on alternative transportation policies.
3. To conduct and support transportation related education activities through the Department of Civil and Environmental Engineering and other WVU academic departments. The centerpiece of these activities are the course offerings and degree programs.
4. To conduct and support technology transfer activities. Such activities include short courses, dissemination of research reports, publication of journal articles, and participation in conferences and other professional meetings.

Housing Information and Research Center

The West Virginia University Housing Information and Research Center was established in 1981. The center's primary mission is to serve the general public and professionals in the field of housing and energy by providing consultant services, education programs, and demonstrations on alternative housing and energy. The center is administered by the technology education program in the College of Human Resources and Education. For further information, call (304) 293-3803.

Multidisciplinary Studies

Multidisciplinary Studies (MDS) courses are those which analyze significant issues, problems, or themes by applying two or more disciplines to them; or which explore the theoretical and methodological relationship of two or more disciplines to each other; or which involve a combination of disciplines so as to preclude their being classified realistically as one of humanities, social science, or physical science.

Responsibility for approving MDS courses rests with the liberal studies program committee and the Faculty Senate. Each course has its own staff, drawn from the faculties of the schools and colleges of the University.

Multidisciplinary Studies (MDS)

250. *Issues in Gerontology*. II. 3 hr. PR: Consent. Analysis of societal aspects of aging and exploration of current issues in gerontology. Relating of gerontological concepts to previous course work and field experience. National Research Center for Coal and Energy

National Research Center for Coal and Energy

In collaboration with the faculty of West Virginia University, the WVU National Research Center for Coal and Energy identifies, develops, promotes, coordinates, supports, and conducts multidisciplinary energy and environmental research and service programs. The NRCCE accomplishes its mission through the efforts of faculty, professionals, students, and external collaborators working through organized program units, each of which serves the specialized needs of its sponsor and user community. The center is located on the Evansdale campus in a building that includes a multimedia meeting facility, an analytical laboratory, a high bay laboratory, and offices.

The center coordinates programs in excess of \$10 million annually. Through its research and service programs, the center supports a number of master's and Ph.D. students. At the center, graduate students will find a limited number of service-related assistantships in the service programs. Research assistantships typically are handled by the academic departments that are responsible for conducting the NRCCE-related research programs. Students interested in learning about research opportunities with NRCCE should contact the academic department in which they plan to enroll to find out about the availability of NRCCE-funded assistantships in that department. To learn more about the types of research and service activities coordinated by the center, students are encouraged obtain a copy of the NRCCE annual status report by contacting the NRCCE Technical Communications Division at (304) 293-2867 ext. 420, West Virginia University, National Research Center for Coal and Energy, PO Box 6064, Morgantown, WV, 26506-6064, world wide web site <http://www.nrcce.wvu.edu>.

Among some of the NRCCE programs are: the Appalachian Oil and Natural Gas Research Program, the Petroleum Technology Transfer Council, the Consortium for Fossil Fuel Liquefaction Science, the Energy and Environmental Research Enhancement Program, the Generic Mineral Technology Center for Respirable Dust, the National Alternative Fuels Training Program, the National Drinking Water Clearinghouse, the National Environmental Training Center for Small Communities, the National Onsite Demonstration Project, the National Small Flows Clearinghouse, the National Mine Land Reclamation Program, the West Virginia Water Research Institute, and the National Environmental Education and Training Center.

Oak Ridge Associated Universities (ORAU)

Since 1957, students and faculty of West Virginia University have benefited from its membership in Oak Ridge Associated Universities (ORAU). ORAU is a consortium of colleges and universities and a management and operating contractor for the U.S. Department of Energy (DOE) located in Oak Ridge, Tennessee. ORAU works with its member institutions to help their students and faculty gain access to federal research facilities throughout the country; to keep its members informed about opportunities for fellowship, scholarship, and research appointments; and to organize research alliances among its members.

Through the Oak Ridge Institute for Science and Education, the DOE facility that ORAU manages, undergraduates, graduates, postgraduates, and faculty enjoy access to a multitude of opportunities for study and research. Students can participate in programs covering a wide variety of disciplines including business, earth sciences, epidemiology, engineering, physics, pharmacology, ocean sciences, biomedical sciences, nuclear chemistry, and mathematics. Appointment and program length range from one month to four years. Many of these programs are especially designed to increase the numbers of underrepresented minority students pursuing degrees in science and engineering related disciplines. A comprehensive listing of these programs and other opportunities, their disciplines, and details on locations and benefits can be found in the *Resource Guide*, which is available by calling either of the contacts below.

ORAU's Member Services office seeks opportunities for partnerships and alliances among ORAU's members, private industry, and major federal facilities. Current alliances include the Pan American Association for Physics, Materials Science Forum, and international initiatives in support of the New Independent States and the republics of Central and Eastern Europe. Other activities include faculty development programs, such as the Junior Faculty Enhancement Awards and the Visiting Industrial Scientist Program, and various services to chief research officers.

For more information about ORAU and its programs, contact Dr. Richard A. Bajura, ORAU Council member, or Ms. Margaret Andreas, Program Assistant, WVU NRCCE, at (304) 293-2867; or contact Monnie E. Champion, ORAU Corporate Secretary, at (615) 576-3306.

Regional Research Institute

The Regional Research Institute is dedicated to multidisciplinary research on the economic and social development of lagging regions such as Appalachia in the United States. It focuses on theories and history of regional development, methods for studying regions, and policies for stimulating their development. The Institute creates learning opportunities and provides research support for faculty members and students. It is an internationally prominent center for the advancement of regional science—an interdisciplinary field that links economics, geography, planning, and other social sciences. Throughout its distinguished three-decade history, the Institute has been a separate unit, independent of any college. Currently, the Institute brings together twenty faculty associates drawn from nine departments in five colleges, a four-person regional science faculty, an extended network of scholars elsewhere in the United States and abroad, and an outstanding group of graduate and undergraduate students.

The Institute has a long-standing reputation for its many contributions to regional science. Regional scientists use quantitative methods and mathematical models to study economic and social phenomena in a regional setting. The Institute's forte has been its pioneering research on methods for analyzing regions and its multidisciplinary approach to studying regional development. Visiting scholars and graduate students from abroad are an integral part of the Institute community. The Institute's journal, *International Regional Science Review*, circulates in more than sixty countries.

The Institute provides research experience and training to students but offers no degree program. Its regional science faculty has long staffed the regional economics doctoral courses in economics, and its alumni are among the nation's leading regional economists. A new set of courses will complement the graduate programs in agricultural economics, natural resource economics, economics, and geography.

Graduate research assistants are nominated by their departments or by faculty associates. The Institute prefers to hire doctoral candidates who have completed one year of graduate study, but master's candidates, undergraduates, and entering graduate students are considered. Most students are in economics, agricultural economics,

or natural resource economics, but geography, history, law and sociology students are regularly represented, too. The students have offices at the Institute and state-of-the-art computing equipment. As their educations progress, so do their roles in research projects. They learn skills, conduct and publish research, and present papers at conferences. In 1993, three students completed dissertations based on their research at the Institute. They continued the Institute's well-established student tradition of writing articles or prize-winning papers while serving as research assistants. Final-year fellowships permit exceptional students to finish their dissertations and prepare their research for publication.

The Regional Research Institute is a National Science Foundation site for research experiences for undergraduates. Each year, 12 students, half from WVU and half selected nationally, spend their junior year at the Institute, conducting research with a faculty mentor and participating in the University's honors program.

For further information about the Institute, contact the Regional Research Institute, West Virginia University, 511 North High Street, P.O. Box 6825, Morgantown, WV 26506-6825; telephone 304-293-2897; fax 304-293-6699; or e-mail RRI@wvnm.wvnet.edu.

Technology Field Service

The Technology Field Service Center was established in 1970. The primary mission of the center is to provide consultant personnel, development, and program design services for schools, businesses, and industries that have education and training needs in the technologies. The center is administered by the technology education program in the College of Human Resources and Education. For further information call (304) 293-3803.

University Affiliated Center for Developmental Disabilities (UACDD)

The mission of the West Virginia University Affiliated Center for Developmental Disabilities (UACDD) is to enhance the quality of life of individuals with developmental disabilities through the provision of interdisciplinary training, exemplary services, technical assistance, information dissemination, and research. This mission is based upon the philosophy that: a) individuals with developmental disabilities have the right to productive, independent and totally integrated lives; b) family and community are the basis for independence and integration; c) systems and services should be consumer-driven; and d) a coordinated, interagency interdisciplinary focus is critical to enhancing the quality of life of individuals with developmental disabilities.

The Center's mandate is to serve, through academic excellence, as a state resource center for developmental disabilities and to: (a) provide interdisciplinary professional educational experiences including preservice training for students for positions in the field of developmental disabilities and outreach training for individuals currently employed or involved in the field of developmental disabilities; (b) provide high quality services for persons of all ages with substantial disabilities and their families; (c) provide technical assistance to persons whose work relates to the field of developmental disabilities, including service providers, parents, agencies, and other organizations at the local, state, and national levels; (d) engage in research and inquiry that will contribute to the understanding and amelioration of developmental disabilities; and (e) disseminate information to audiences on effective practices and programs, training techniques, and research findings relevant to the field of developmental disabilities. This Center is funded by the U.S. Department of Health and Human Services' Administration on Developmental Disabilities.

West Virginia Rehabilitation Research and Training Center

The West Virginia Rehabilitation Research and Training Center was established in 1965 to carry out programmatic research in the area of disability. The Center's core emphasis is the application of information technology to enhance rehabilitation. This

program is funded by the National Institute on Disability and Rehabilitation Research (NIDRR) of the U.S. Department of Education.

WVU Extension Service

The WVU Extension Service, part of an educational network of 105 land-grant universities, takes the helping hand of West Virginia University directly to thousands of West Virginians in communities scattered across the state. Through its Extension Service, the University provides a "mini campus" in each of the state's 55 counties. The work at these locations addresses a wide variety of community issues via a nontraditional mix of learners, faculty, staff, and volunteers.

Drawing on the strengths of WVU's many academic disciplines, Extension educators target social, economic, environmental, and technical problems of communities. Some Extension educators work on WVU's traditional campuses located in Morgantown, but many of the faculty work in county settings, generally located in or near each county's governmental seat. Working daily with local residents, Extension faculty find their lives often intertwine with the issues that confront their local communities. They are committed to helping people find answers that work. As they solve problems along with local citizens—individually and in groups—Extension faculty and staff translate WVU's research and knowledge into action.

When graduate and undergraduate students take part in this action, they find the WVU Extension Service to be a fertile, flexible provider of a variety of internship, work-study and volunteer experiences. Extension educators may involve students in some or in all phases of their educational projects—research, design, delivery, and evaluation. Depending on the project, students may have hands-on experience with video production, computer networks, distance education, publication design and production, radio and television production, curriculum design and development, and classroom teaching.

However, students may not be familiar with the diversity of experiences available to them through the WVU Extension Service. They may not equate the name "WVU Extension Service" with educational programs on and off campus. Those who do recognize the name are often familiar with only a segment of Extension's multifaceted programs.

Extension programs have roots in many career fields, including agriculture, business administration, child development, computer science, communications, environmental science, engineering, counseling and guidance, curriculum design, health education, home economics, journalism, and safety. Regardless of their academic disciplines, today's students may find rich learning experiences—and rewarding careers—among Extension's diverse educational programs. Whether on campus or off campus, WVU students are invited to work with the WVU Extension Service:

- as it helps volunteer firefighters learn to protect families and property. (For example, in one year 13,000 volunteers participated in Fire Service Extension's fire suppression and rescue education programs throughout West Virginia.)
- as it helps children learn skills that help them build character and plan careers. (Annually, more than 20,000 youths "learn by doing" through 4-H projects and programs; another 20,000 special youth populations participate in school retention and enhancement programs.)
- as it helps individuals learn new ways to produce income. (For example, 900 individuals recently were trained to provide quality child care. Many other West Virginians learned direct marketing and other entrepreneurial skills. Some are participating in alternative product development projects. The multicounty endeavors include the aquaculture freshwater trout ventures, the pepper production and marketing program, and the commercial ginseng production pilot project.)

- as it trains volunteers to serve West Virginia's communities and schools. (During one program year, approximately 4,900 adult and youth volunteers were trained to help young people. Others were trained to serve on local boards and committees, or to deliver expertise in a specific subject matter such as gardening, literacy, or health and safety issues.)

- as it helps farmers improve productivity. (Through integrated pest management, farmers are increasing their savings by learning to control crop pests with fewer pesticides. Through total resource management, soil testing, and other Extension programs, farmers are employing better production and management practices for livestock and produce.)

- as it helps landowners learn to use natural resources more wisely. (West Virginia's natural resources are being protected as landowners use WVU Extension's water quality and timber conservation strategies and as homeowners adopt composting, yard waste management, and recycling techniques.)

- as it helps families become more resilient and healthy. (For example, during one program year, 929 rural families and more than 8,000 homemakers learned nutrition, food management, and food preparation skills. Families in all 55 counties are participating in WVU Extension skill-building programs that are helping them employ positive child care, family communication, and health care strategies.)

- as it helps managers and laborers improve relations and workplace safety. (Every year, laborers throughout the state learn their rights and responsibilities for positive negotiations through courses conducted by the Institute for Labor Studies and Research. West Virginia's industries are increasing workers' safety while saving health care and business dollars by consulting with Safety and Health Extension (SHE). SHE's services include on-site safety audits and employee training in Occupational Safety and Health Administration (OSHA) guidelines.)

- as it helps local governments learn strategies to tackle economic and community development issues. (Solid waste authority representatives turn to WVU Extension for training on the latest developments in technology, regulation, and program implementation. Similarly, WVU Extension is helping communities plot their development for the next decade. Ten communities already have developed tourism plans.)

- as it helps industries, manufacturers, and other businesses increase productivity and retain jobs for West Virginians. (Ninety-one projects coordinated recently by WVU Industrial Extension have made West Virginia's industries and manufacturers more competitive. Many jobs have been created or saved through WVU Extension's business and retention assistance to more than 145 enterprises.)

WVU Extension programs are financed via a variety of funding combinations: federal appropriations and grants; state appropriations and grants; county commission, county school board, and other local governmental appropriations; and private grants.

Graduate and undergraduate internships, work-study appointments, and volunteer service positions may be available on the Morgantown campus and in any of the 55 counties. Program priorities and funding determine the duration of appointments during regular semester and summer sessions.

For more information, contact the WVU Extension Service at 293-5691; or write to Student Appointments, Office of Recruitment and Training, WVU Extension Service, 808 Knapp Hall, P.O. Box 6031, Morgantown, WV 26506-6031.

Part 6 Index

A

abbreviations used in course listings, 52
absences, 29
academic common market, 13, 225
academic integrity/dishonesty, 45
academic rights, 26
academic standards for admission, 21
accountancy, professional, 202
accounting courses, 204, 208, 229
acting, 253
active/inactive status, 24
addresses for correspondence, 4
admission standards, 13
admissions, 21
 academic standards, 21; classifications, 21; to Ph.D. candidacy, 32; to Ph.D. program, 32
advertising courses, 404
advising, 24, of non-degree students, 22
agricultural and resource economics, 60, courses, 61, 84
agricultural biochemistry courses, 67
agricultural economics, 63
agricultural education, 59, courses, 59
agricultural sciences, 64
agriculture, 66, courses, 67
Agriculture and Forestry, College of, 53 admission requirements, 54; graduate faculty, 55; graduate programs and degrees, 53
Aging, see Center on Aging
agronomy courses, 87
 crop science, 87; soil science, 88
anatomy, 412, courses, 265, 414
animal and veterinary sciences, 67, courses, 68
animal nutrition courses, 69
animal physiology and breeding courses, 69
animal production courses, 70
animal subjects in research, 30
anthropology, see sociology and anthropology
application for graduate study, 16
 concurrent or additional master's degree, 18; forms/fees, 17; GMAT, 17; GRE, 17; international students, 18; non-degree applicants, 17; reapplication, 18; second review, 18; transcripts, 17

art, 233
 art education, 236; art history, 236; studio art, 237; visual arts, 235;
art courses, 237
Arts and Sciences, Eberly College of, 91
 graduate faculty, 92; graduate programs and degrees, 92
assistant vice presidents, 8
assistantships, 43
 administrative, 44; advising center, 44; loans, 45; remission of tuition, and fees, 43; research, 44; residence hall, 44; teaching, 44; terms of employment, 43; veterans, 45
astronomy courses, 170
athletic training courses, 459
audits, 26, 41

B

bibliography and research courses, 131
biochemistry, 416, courses, 417
bioengineering, 316
biology, 102, courses, 103, 418
Board of Advisors, 5,7
Board of Trustees, 5,7
broadcast news courses, 404
Business and Economics, College of, 198
 CPA examination, 202; graduate faculty, 199; graduate programs and degrees, 199
business administration, 206
business law courses, 210, 229

C

cabinet, 7
calendar, academic year, 488
campus maps, 486, 487
CEMR, see Engineering and Mineral Resources, College of
Center for Women's Studies, 196
Center on Aging, 418
chaired and distinguished professors, 9
cheating, 46
chemical engineering, 276, courses, 279
chemistry, 107, courses, 108
child development and family studies courses, 71
civil and environmental engineering, 282
civil engineering courses, 284
classics courses, 131

- classification of graduate students, 21
- common course numbers and descriptions, 51
- communication studies, 111, courses, 113
- community health education, 419
- community health promotion, 419, courses, 420
- community medicine courses, 439
- computer engineering courses, 297
- computer science, 115, courses, 118
- Computing Services, 37
- concurrent or additional master's degree, 18
- counseling, 342, courses, 346, 370, 418
- counseling psychology courses, 348
- course information, 50
 - abbreviations used in course descriptions, 52; plan for numbering courses, 50; programs and courses, 50
- CPA examination, 202
- Creative Arts, College of**, 231
 - graduate faculty, 232; graduate programs and degrees, 232
- credit limitations, 23; overloads, 24
- curriculum and instruction, 345, courses, 361, 374

D

- deans, 8
- degree completion, 30
 - final examinations, 31; graduate committees, 30; request for degree, 30; research guidelines, 30; theses and dissertations, 31; time limitations, 30, 33
- degree programs, 10
- dental hygiene, 261, courses, 263
- dentistry courses, 263, 264
- Dentistry, School of**, 260
 - graduate faculty, 261; graduate programs and degrees, 260
- directors, 8
- Disability Services, Office of, 37
- dissertation, 31, 34
- distinguished professors 9
- doctoral degree, 31
 - candidacy, 32; dissertation, 33, 34; final examination, 33; final requirements, 35; registration/residency requirements, 33; summary of requirements, 34; time limitations, 33

- DuBois Fellowships, 45

E

- Eberly College of Arts and Sciences**, see Arts and Sciences, Eberly College of
- economic, 216
- economics courses, 210, 220, 230
- education foundations, 349, courses, 350
- educational leadership studies, 350, courses, 351
- educational psychology, 355, courses 357
- electrical and computer engineering, 291
- electrical engineering courses, 298
- elementary education, 359
- endodontics, 263, courses, 264
- Engineering and Mineral Resources, College of**, 267
 - graduate faculty, 270; graduate programs and degrees, 267
- engineering of mines courses, 324
- English 122, courses, 125
- English as a second language courses, 132
- English proficiency, 19
- enrollment and registration, 23
 - academic rights, 26; active/inactive status, 24; advising, 24; auditors, 26; credit limitations, 23; degree progress, 24; extended learning/off-campus study, 25; final semester, 26; full-/part-time, 26; minimum enrollment, 25; non-degree students, 22; overloads, 24; plan of study, 24; records, 25
- Evansdale Library, 36
- exercise physiology, 422, courses 424
- extended learning, 25
- Extension Service, WVU, 478

F

- facilities and fees, 36
 - audits, 41; campus, 37; computing services, 37; Disability Services, Office of, 37; fee charts, 48; housing, 36; lab fees, 40; libraries, 36; music fees, 40; non-sufficient funds check policy, 42; off-campus fees, 40; refund policy, 41; residency policy, 38; restrictions for outstanding debts, 40; special service fees, 40; summer

- sessions, 49; waivers, 41
- faculty assembly, 6
- faculty senate, 5
- family resources, 70, courses, 72
- fees and expenses, 41
 - additional fees for pharmacy graduate students, 49; audits, 41; cost of an academic year's work, 43; fee charts, 48; health sciences, 48; Higher Education Resource Fund, 48; lab fees, 40; music fees, 40; non-sufficient funds check policy, 42; off-campus fees, 40; other fees, 49; refund policy, 41; refund schedule, 42; remission of fees, 43; summer session tuition and fees, 42, 49; waivers, 41; withdrawals, 41
- fellowships, 45
 - Swiger Fellowships, 44; teaching fellow, 44; W.E.B. DuBois Fellowships, 45
- final examinations, 31
- finance courses, 210, 230
- financial aid, 43
 - application, 43; assistantships, 43; fellowships, 43; loans and employment, 45; remission of tuition, 43; stipends (terms of employment), 44; Swiger Fellowships, 44; veterans educational assistance, 45; W. E. B. DuBois Fellowships, 45
- food science courses, 70
- foreign languages, 127
- foreign literature in translation courses, 132
- forest hydrology courses, 75
- forest management courses, 75
- forestry 73, courses, 74
- forgery/fraud, 46; hearing procedures, 47
- French courses, 132

G

- genetics and developmental biology, 80
- genetics courses, 81
- geography 137, courses, 139
- geology 143, courses, 146
- German courses, 133
- gerontology courses, 418
- governance and organization of WVU, 5
 - assistant vice presidents, 8; Board of Advisors, 5, 7; Board of Trustees, 5, 7; cabinet, 7; chaired and distinguished

- professors 9; deans, 8; directors, 8; faculty assembly, 6; faculty senate, 5; staff council, 6
- grade point average, 27
- grading scale, 26
 - GPA, 27; incompletes, 27; pass/fail, 27; S/U, 27; senior petition, 28
- graduate assistantships, 43
- graduate committees, 30
- graduate council, 14
- graduate education, 13
 - academic common market, 13; application, 17; graduate council 14; graduate faculty, 14; Office of, 14; policies, 14
- graduate faculty, 14
- Graduate Opportunities for Advanced Level Study (GOALS), 225
- GMAT, 17
- GRE, 17

H

- Harley O. Staggers National Transportation Center, 474
- Higher Education Resource Fund, 48
- history 149, courses, 151
- history of music, 242
- home economics education courses, 72
- home management and family economics courses 72
- housing 36
 - Housing and Residence Life, Office of, 36; off-campus housing, 36; residence halls, 36
- Housing Information and Research Center, 474
- human nutrition and foods courses, 72
- Human Resources and Education, College of, 334**
 - graduate faculty, 337; graduate programs and degrees, 334
- human subjects in research, 30

I

- incompletes, 27
- industrial and labor relations courses, 212, 228
- industrial and management systems engineering, 301, courses, 304
- industrial relations, 224
- Industrial Relations Student Association (IRSA), 225

Institute of Industrial and Labor Relations, 226
intensive English program, 19
interior design courses, 72
internal credit transfer 21
international students, 18
 English proficiency, 19; intensive English program, 19; required materials, 19; student visa, 19; TOEFL scores, 19; transferring within USA, 20

J
Journalism, Perley Isaac Reed School of, 39
 graduate faculty, 399; graduate program and degree, 398
journalism courses, 405

L
language teaching methods courses, 134
liberal studies, 158
librarian/media specialist, 374
library services, 36
 Evansdale Library, 36; other libraries, 37; West Virginia Collection, 36; Wise Library, 36
linguistics courses, 134
loans and employment, 45

M
M.B.A. program, 207
management courses, 213, 230
maps of campus, 486, 487
marketing courses, 215, 230
master's degree
 committee, 30; summary of requirements, 35; thesis, 31
mathematics, 160, courses, 161
mechanical and aerospace engineering, 310, courses, 316
medical technology, 425, courses, 428
Medicine, School of, 407
 graduate faculty, 408; graduate programs and degrees, 407
microbiology and immunology, 428, courses, 430
microbiology courses, 264
minimum required enrollment, 25
mining engineering, 323
Morgantown, 36

multidisciplinary studies, 474, courses, 475
music, 240
 audition, 241; composition, 241, 243; history of music, 242; music education, 240, 242; performance, 240, 243; theory, 243
music courses, 248
music fees, 40

N
National Research Center for Coal and Energy, 475, cooperative projects, 144
natural resource economics, 82
news-editorial courses 406
non-degree applicants, 17; changes to classification, 21
non-sufficient funds check policy, 42
Nursing, School of, 441
 courses, 448; graduate faculty, 442; graduate program and degrees, 444

O
Oak Ridge Associated Universities (ORAU), 475
occupational hygiene and occupational safety courses, 309
off-campus housing, 36
off-campus study, 25
orthodontics, 265, courses, 265

P
part-time enrollment, 26
pathology courses 264, 266
Perley Isaac Reed School of Journalism, see Journalism, Perley Isaac Reed School of
petroleum and natural gas engineering, 328, courses, 329
pharmaceutical sciences, 452
pharmacology and toxicology, 432, courses, 264, 434
pharmacy, additional fees for, 50
pharmacy courses, 454
Pharmacy, School of, 45
 graduate faculty, 451; graduate programs and degrees, 451
philosophy courses, 165
Physical Education, School of, 456
 graduate faculty, 456; graduate programs and degrees, 456

physical education teacher education courses, 460
physics, 166, courses, 167
physiology, 435, courses, 436
plagiarism, 46, hearing procedures, 47
plant and soil sciences, 87
plant science courses, 89
policies for graduate education, 14
political science, 170, courses, 173
programs and courses, 50
 common course numbers and descriptions, 50; plan for numbering courses, 50
provisional classification, 22; reclassification, 23
PRT (personal rapid transit) system, 36
psychology, 178, courses, 179, 418
public administration, 185, courses, 187
public health, 438
public relations courses, 406

R

reading, 366, courses, 367
reapplication, reactivation, 18
recreation and parks courses, 76
refund policy, 41, 42
Regional Research Institute, 476
registration, 23; see also enrollment
rehabilitation counseling, 369, courses, 371
remission of tuition, 43
reproductive physiology, 89
request for degree, 30
research guidelines, 30
 animal subjects, 30; human subjects, 30
residence halls, 36
residency policy for admission and fee purposes, 38
 appeals, 39; change of residence, 39; classification, 38; dependency, 39; determination, 38; domicile, 38; former domicile, 39; military, 39; noncitizens, 39; out-of-state students, 38; Ph.D., 33
resource management courses, 60, 64, 86
Russian courses, 136

S

safety and environmental management, 331, courses, 331

scholarship, 26
 definition of letter grades, 27; GPA, 26; grades less than C, 28; grading system, 26; incompletes, 27; pass/fail grades, 27; satisfactory/unsatisfactory grades, 27; senior petition, 28; transcripts, 28
secondary education, 372
social work, 465, courses, 470
Social Work, School of, 464
 graduate faculty, 464; graduate program, 464
sociology and anthropology, 189, courses, 190
Spanish courses, 136
special education, 377, courses, 382
special opportunities, 474
speech pathology and audiology, 386, courses, 387
sport behavior, 459; management, 459
sport studies courses, 462
staff council, 6
statistics, 192, courses, 194, 264, 266
stipends, 44
summer session tuition and fees, 49
Swiger Fellowships, 44

T

teaching fellow, 44
technology education, 391, courses, 395
Technology Field Service Center, 477
TESOL requirements, 128
textiles and clothing courses, 73
theatre, 253
 acting, 253; design, 254
theatre courses, 255
theses, 31
TOEFL scores, 18, 19
transcripts, 17
 fees, 28; forfeiture, 28
transfer procedures, 20
 credit hours, 20; internal credit transfer, 21; program transfer, 21; transfer to WVU, 20; within the USA, 20
Transportation Center, see Harley O. Staggers Transportation Center
tuition waivers, 43

U

University Affiliated Center for Developmental Disabilities (UACDD), 477

University Computing Services, 37
University System Board of
Trustees, 5,7

V

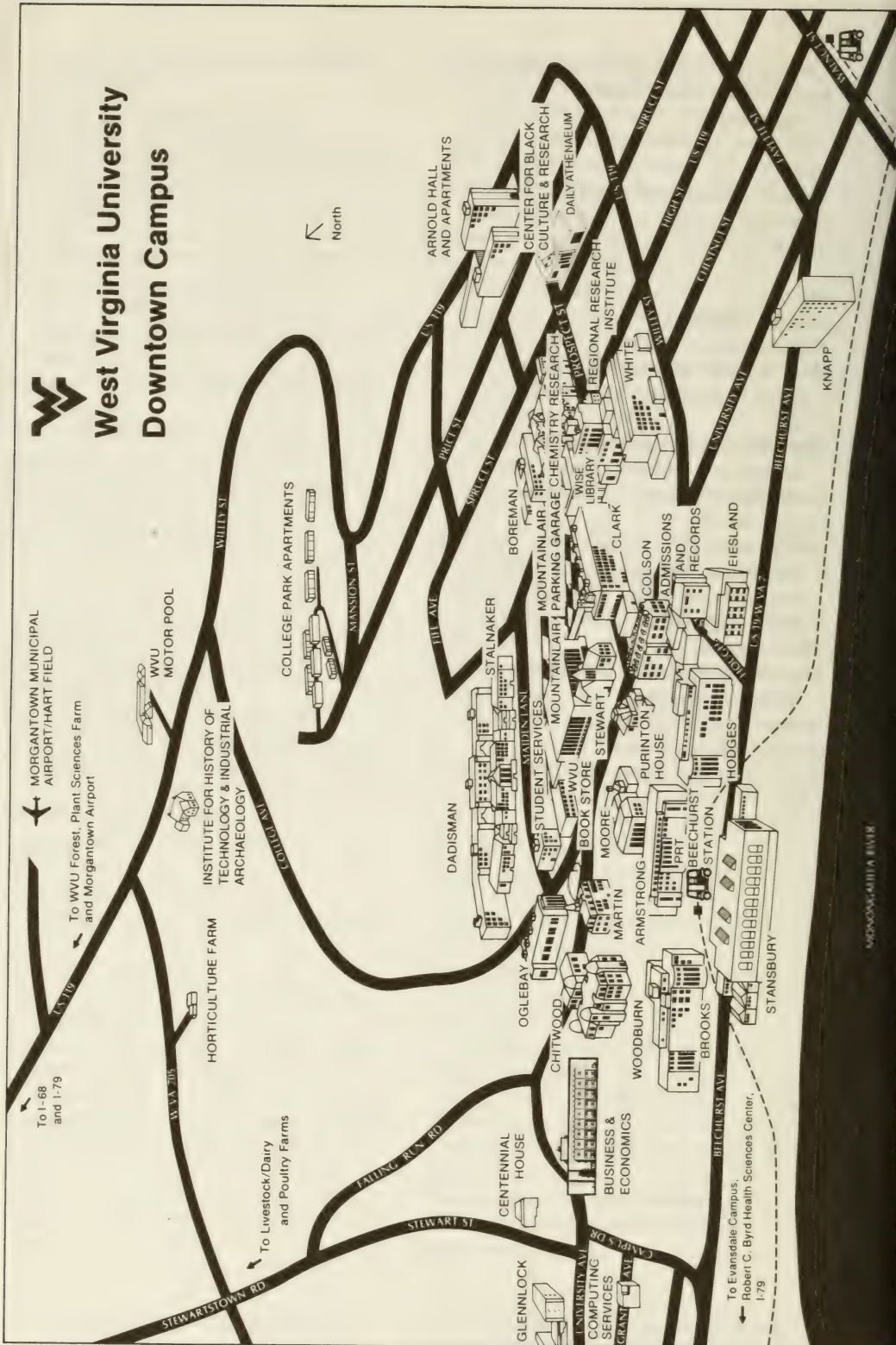
veterans educational assistance, 45
veterinary science courses 70
vice presidents, assistant, 8

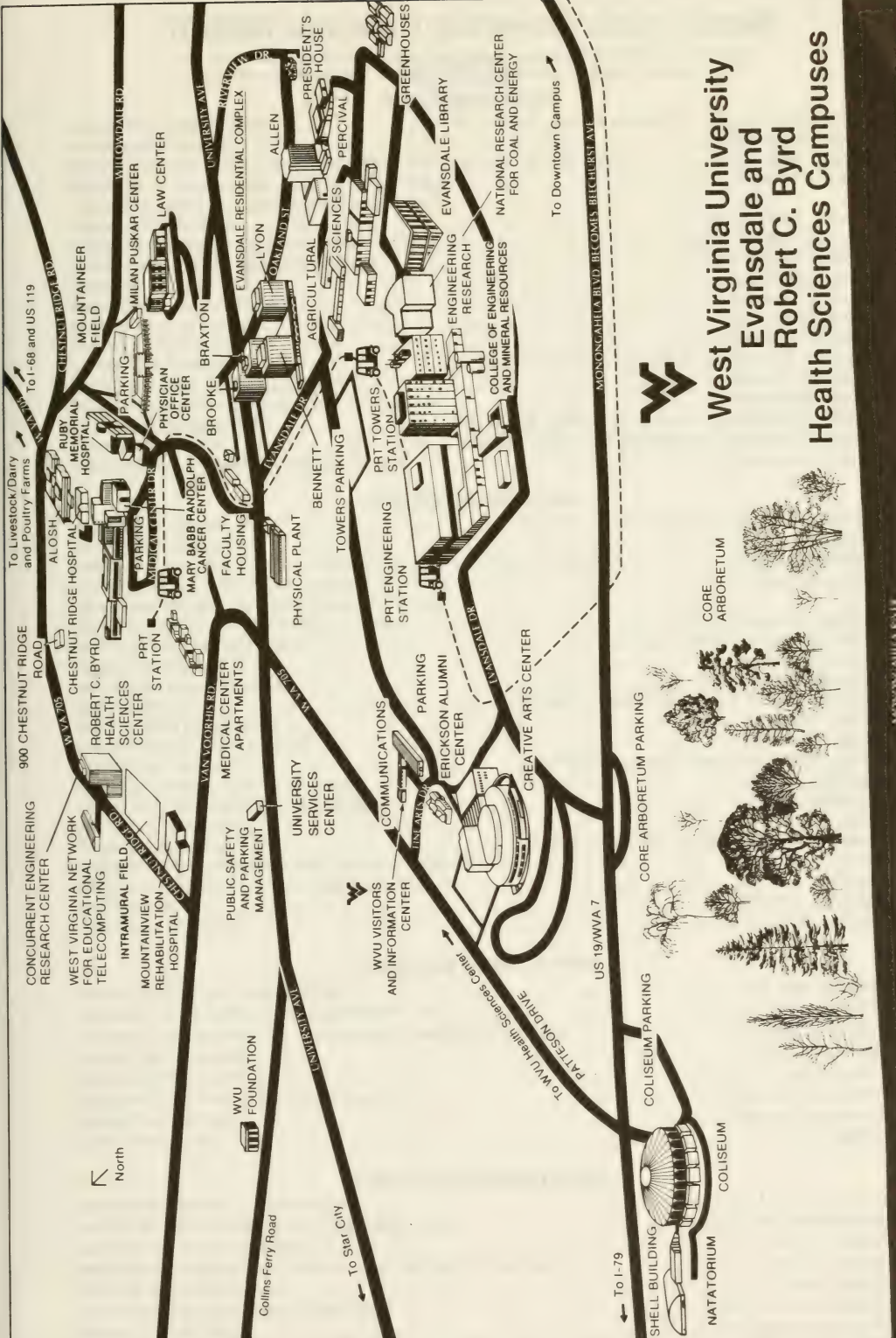
W

waivers of fees, 41
West Virginia Collection Library, 36
West Virginia Network for Educational Telecomputing (WVNET), 37
West Virginia Rehabilitation Research and Training Center, 477
wildlife and fisheries management courses, 77
withdrawals, 28
 deadlines, 29; from classes, 28;
 from the University, 29; procedures, 29; refunds, 41
Wise Libraries, 36
women's studies, see Center for Women's Studies
women's studies courses, 197
wood science courses, 78
WVU Extension Service, 478



West Virginia University Downtown Campus





West Virginia University

Evansdale and Robert C. Byrd Health Sciences Campuses



West Virginia University Calendar 1996-97

The University calendar includes the academic year, which is composed of two semesters of approximately seventeen weeks each, and two summer sessions of six weeks each.

FIRST SEMESTER

Wednesday, August 14 through Friday, August 16	New student orientation
Friday, August 16	General registration
Monday, August 19	First day of classes, Late registration fee in effect for all students
Friday, August 23	Last day to register, add new courses, make section changes, change pass/fail and audit
Monday, September 2	Labor Day recess
Saturday, September 14	Rosh Hashanah (day of special concern)
Monday, September 23	Yom Kippur (day of special concern)
Friday, October 4	Mid-semester
Tuesday, October 8	Mid-semester reports due
Friday, October 25	Last day to drop a class
Tuesday, November 5	Election day recess
Saturday, November 23 through Sunday, December 1	Thanksgiving recess
Thursday, December 5	Last day to withdraw from University
Friday, December 6	Last day of classes, December convocation
Monday, December 9 through Saturday, December 14	Final examination week
Sunday, December 15 through Thursday, January 2, incl.	Christmas recess
Friday, December 27	Degree conferring date (no ceremonies)

SECOND SEMESTER

Thursday, January 2 and Friday, January 3	New student orientation
Friday, January 3	General registration
Monday, January 6	First day of classes, Late registration fee in effect for all students
Friday, January 10	Last day to register, add new courses, make section changes, change pass/fail and audit
Monday, January 20	Martin Luther King, Jr., birthday recess
Friday, February 7 (not a holiday)	West Virginia University Day
Friday, February 21	Mid-semester
Tuesday, February 25	Mid-semester reports due
Saturday, March 1 through Sunday, March 9	Spring recess
Friday, March 21	Last day to drop a class
Friday, March 28	Friday before Easter recess
Friday, April 11 through Sunday, April 13	Weekend of Honors
Tuesday, April 22	Passover (day of special concern)
Thursday, April 24	Last day to withdraw from University
Friday, April 25	Last day of classes
Monday, April 28 through Saturday, May 3	Final examination week
Monday, May 5	Grade reports for all graduates due in dean's office
Tuesday, May 6	Dean's reports on graduates due in ARC
Saturday, May 10	Alumni Day
Sunday, May 11	Commencement

1997 SUMMER SESSION I

Monday, May 19	Registration, First day of classes
Tuesday, May 20	Late registration fee in effect for all students
Thursday, May 22	Last day to register, add courses, or make section changes
Monday, May 26	Memorial Day recess
Friday, June 13	Last day to drop a class
Wednesday, June 25	Last day to withdraw from University
Thursday, June 26	Last day of classes
Friday, June 27	Final examinations

1997 SUMMER SESSION II

Tuesday, July 1	Registration, First day of classes
Wednesday, July 2	Late registration fee in effect for all students
Friday, July 4	Independence Day recess
Monday, July 7	Last day to register, add courses, make section changes
Friday, July 25	Last day to drop a class
Wednesday, August 6	Last day to withdraw from University
Thursday, August 7	Last day of classes
Friday, August 8	Final examinations
Friday, August 15	Degree conferring date (no ceremonies)

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The University System of West Virginia

1018 Kanawha Boulevard, East • Suite 700

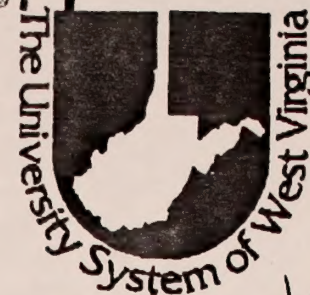
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Telephone 304-558-2736 Facsimile 304-558-3264

Charles W. Manning
Chancellor

Kay Goodwin
Chairman, Board of Trustees

FILE COPY



*Russ - please handle
in both of your
capacities*

February 25, 1997

Mr. David C. Hardesty, Jr.
President
West Virginia University
P.O. Box 6201
Morgantown, WV 26506-6201

Dear President Hardesty:

The University System Board of Trustees at its meeting on February 21, 1997 approved the conversion of the Ed.D. in Education (Counseling Psychology) to the Ph.D. in Counseling Psychology. The degree inventory in the State College and University System Central Office has been changed to indicate the new degree designation.

Sincerely,

Charles W. Manning
Chancellor

CWM/pc

cc: Bruce Flack
Gerald Lang

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C: Jeff Messing

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Office of Admissions and Records
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